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Thesis

The Character and Influences of Scandinavian Geographic Conditions as They Occur the World Over

by

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INTRODUCTION

The purpose of this thesis is to present the areas throughout the world whose geographic environments are similar to that of the Scandinavian peninsula, and then to analyze and compare their physical conditions and influences, especially on the size and extent of the population and the activities of the people. In order to avoid confusion, I have limited the area for comparison to the Scandinavian peninsula alone, which includes the two political units, Norway and Sweden.

The method of presenting the material included in this thesis is very simple. Nevertheless, I believe it to be the most adequate and satisfactory one to pursue in attempting to give the information in as clear and concise a form as possible. Part One, The Physical Environment of the Scandinavian Peninsula, is a treatment of the physical character and influences of the geographic environment on the life and activities of the people of that region. It is discussed here at some length due to the necessity of forming clear, definite principles of Scandinavian geography.

Part Two is the application of these principles to areas of the Northern hemisphere, where similar conditions prevail. (A small section of south Chile in the southern hemisphere might be included here, but because of its isolated location, and the sparsity of its population, it is disregarded

entirely.) In many instances, the areas are merely the coastal portions of larger regional units, and allowances for this will have to be taken into consideration. Naturally, all areas will not show agreement in every respect, and particular attention will be called to any conditions which do not conform to the general principles.

Since climate is the most important factor of the physical environment of the Scandinavian peninsula, it will be used as the fundamental basis for consideration and comparison. Scandinavian climate consists of two types. One, a marine condition, has mild winters and cool summers, with a tendency toward damp and cloudy weather. The other is a transition between marine and continental climates. This type has more severe winters and warmer summers.

Maps and statistical tables are placed throughout the material in order that the physical conditions may be offered in a visual and more concise form.

Part I

The Physical Environment of The Scandinavian Peninsula

CHAPTER I

LOCATION AND CLIMATE

The location of a region in respect to other land areas, water bodies, ocean currents, and winds, is one of the most important geographic factors which influences that region. It determines, for instance, what the climate shall be and how important the area shall be in relation to other regions. Scandinavia is the most northerly as well as the largest peninsula of Europe. It is essentially an island due to the fact that almost one-third of the entire peninsula is situated above the Arctic Circle, an area which tends to be a barrier to transportation and communication by means of land with the rest of the continent.

Although the peninsula is thus isolated by the land connection on the north, it has easy access to the continent by way of numerous islands, the "stepping stones" to Denmark and Northern Germany. Thus it has not failed to receive both cultural and material benefits from Europe nor to extend its influence over the rest of the world. For this reason the Scandinavian peninsula "commands the interest and attention of the rest of the world because of its physical difficulties and human accomplishments."[1]

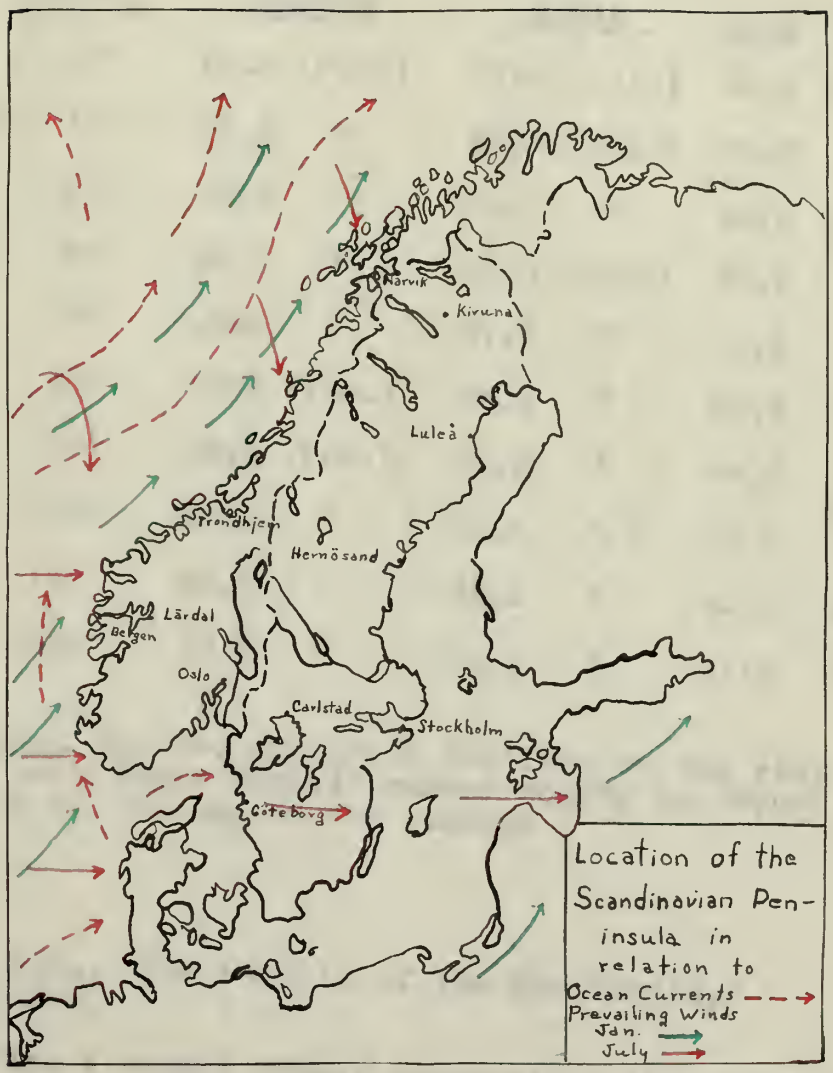
1: Bogardus, J., "Europe, a Geographical Survey," Page 173.

The most important feature of the peninsula's location is its situation in regard to water bodies and prevailing winds. (Map I, page 4) To the westward lies the Atlantic Ocean with its North Atlantic Drift, a continuation of the Gulf Stream, which carries warm waters from the vicinity of the equator northward, parallel and close to the whole Norwegian Coast. On the east lies the Baltic Sea, while the North Sea borders its southern shores. Thus the peninsula is almost entirely surrounded by water. Furthermore, it lies to the leeward of the prevailing westerly winds which blow from the ocean over the land. The importance and influence of these water bodies and prevailing winds will be analyzed further under the discussion of climate.

The climate of Scandinavia may be subdivided into two general regions, which vary because of different factors which influence them. The first climatic region, a narrow belt along the western coast of Norway, has mild winters, cool summers, and much damp and cloudy weather. The second region includes the remainder of the peninsula, which has colder winters and warmer summers--a transition between marine and continental climate conditions. The boundary between these regions follows approximately the crest line of the highlands. There is no sharp line of demarcation between the two but rather a gradual transition from one to the other. The boundary, as shown on any map is drawn arbitrarily to illustrate the approximate conditions as they occur.

Table I, page 5 , shows the mean yearly and the

MAP I


Narvik
Kiruna
Luleå
Trondhjem
Hernösand
Lärdal
Bergen
Oslo
Carlstad
Stockholm
Göteborg
Location of the Scandinavian Peninsula in relation to
Ocean Currents
Prevailing Winds
Jan.
July

MAP I

Location of the
Scandinavian Pen-
insula in
relation to
Ocean Current
Prevailing Wind
Jan
July

TABLE I

MEAN TEMPERATURES (°F.)[1]

Station	Alt. in ft.	Coldest Month	Warmest Month	Year	Range
Trondhjem	33'	26.8 (Feb.)	57.2 (July)	40.5	30.4
Christiansund	49'	33.6 "	55.8 (Aug.)	43.5	22.2
Ona	33'	25.5 "	54.7 "	43.9	19.1
Lärdal	16'	29.5 "	60.6 (July)	43.5	31.1
Bergen	66'	22.6 "	57.9 "	44.6	24.3
Oslo	82'	24.4 (Jan.)	63.1 "	42.4	38.7
Göteborg	33'	30.4 (Feb.)	62.2 "	45.0	21.8
Carlstad	180'	25.5 "	62.4 " [2]	42.3	36.9
Stockholm	148'	25.7 "	62.1 "	42.1	36.4
Hernösand	344'	19.9 "	59.2 "	37.9	39.3

(Notice that the two northerly stations on the west coast have their warmest summer months in August because of the lag of the seasons.)

1. Kendrew, W.G., "The Climate of the Continents," pp. 293-294.

2. Carlstad has a warmer summer temperature than might be expected for an interior station. The reason for this may be due to the fact that it is situated to the leeward of Lake Verner, the largest lake in Central Sweden.

TABLE I

MEAN TEMPERATURES (°F.)*

Station	Elev. in ft.	Coldest Month		Warmest Month		Year	Long.
Thermolyne	25'	25.8	(Jan.)	87.2	(Aug.)	58.4	80.4
Christmas Mts.	42'	27.8	"	85.6	(Aug.)	59.2	87.3
Ft.	54'	28.2	"	84.7	"	60.8	129.
Imperial	16'	29.5	"	86.0	(Aug.)	62.5	74.7
Iverson	61'	28.9	"	87.3	"	64.8	84.2
Ocean	84'	24.1	(Jan.)	85.1	"	64.4	89.7
Whitney	22'	26.4	(Jan.)	86.6	"	63.9	91.8
Centralia	180'	32.5	"	81.4	"	61.2	86.3
Escondale	145'	25.7	"	86.1	"	62.1	87.6
Ironsburg	2424'	19.2	"	82.6	"	57.6	86.1

(Waiting Bert the two northerly stations in the west. Don't have their warmest summer month in August because of the lag of the seasons.)

1. Bradley, W.C., "The Climate of the Continent," pp. 250-254.

2. Derived for a warmer summer temperature than eight to maximize for an interval difficult. The reason for this may be due to the fact that it is situated to the leeward of Lake Vetner, the largest lake in central Asia.

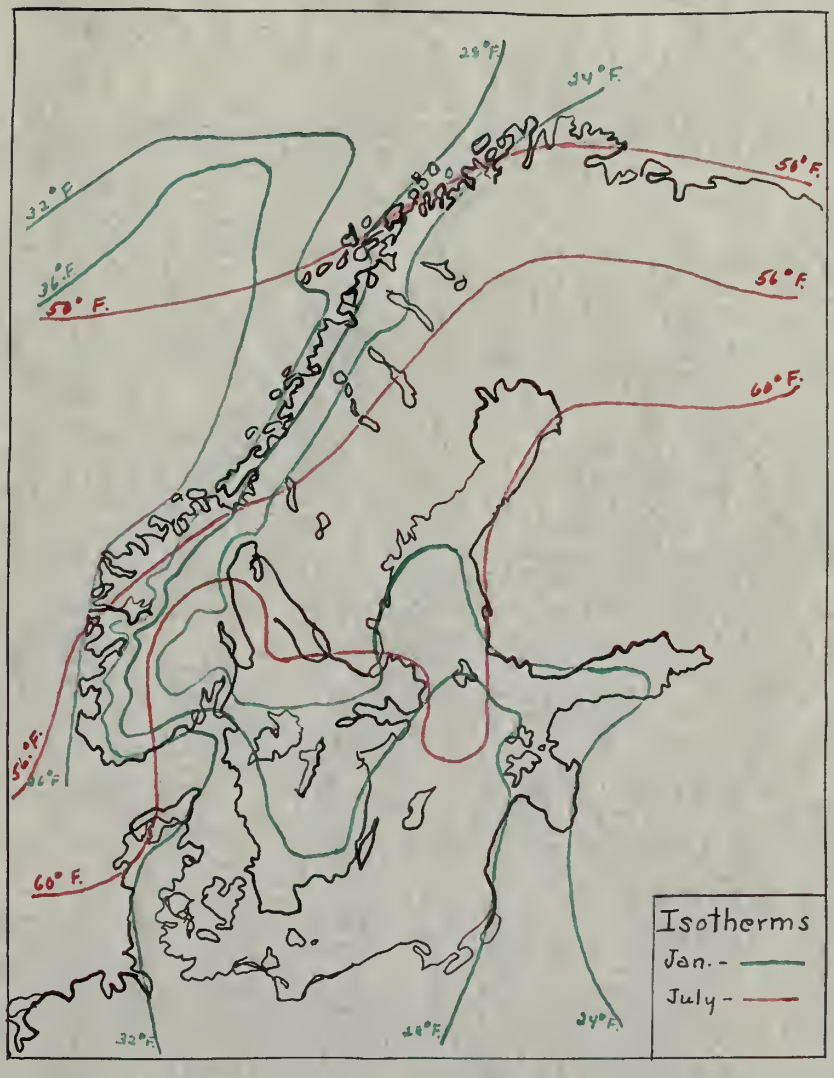
warmest and coldest temperature recordings for a few selected stations. These stations are situated in the more densely populated parts of the peninsula, because it is here that influences on human life may best be shown. No recordings are given for any area where there are less than three months with average temperatures of 50°F. and over, a period which is necessary for agriculture. From these statistics it will be seen that there is a decided uniformity of temperatures over the whole peninsula. Nowhere is the coldest month lower than 15°F (with the exception of the highlands), and in most cases February is the coldest month.

In winter the west coast temperatures are far higher than they would be if the average were based on latitude alone. Toward the east temperatures become lower. The January isotherm of 32°F. runs almost parallel and very close to the coast of Norway, in general following the crest of the highlands. (See map II, page 7). This map shows that temperature conditions vary more from west to east than from north to south on the western side of the highlands. In Sweden, however, the isotherms correspond with latitude.

The main air temperature in January over the ocean west of Norway is more than 40° above the average for that latitude.[1] The ocean here is never frozen even in the most severe winters as far north as the North Cape. Even drift ice

1: Kendrew, W., "The Climates of the Continents", Page 240.

MAP II


28°F.
34°F.
32°F.
36°F.
50°F.
50°F.
56°F.
60°F.
56°F.
60°F.
32°F.
46°F.
34°F.
Isotherms
Jan.
July

never reaches the coast. Southward along the coast from Trondhjem, the average winter temperatures remain above 32°F. Inland, temperatures become lower and the heads of the largest fiords are as much as 10° colder than at their mouths.[1] At altitudes above 2000' conditions become more rigorous.

The crest of the highlands acts as a barrier to the continuation of these mild conditions farther inland. To the east of these mountains, the winters are more severe which is illustrated by a comparison between Bergen, situated directly on the west coast and Oslo, which lies to the leeward of the mountains and at the head of a large fiord. Bergen has a mean January temperature of 34.2°F. while Oslo records 24.4°F., a difference of almost 10°. Within Scandinavia temperatures depend on altitude and distance from the sea. Even though Göteborg, Stockholm, and Hernösand are located on the Baltic coast, they have more severe winter temperatures and at least two months with average recordings below 32°F.

The entire Swedish coast may be blocked by ice at this time, but on the south and southeast coasts, this is an exception rather than the rule. Drift ice from the northern part of the Baltic often obstructs the Sound on the south, and in exceptionally severe winters the Sound may be completely frozen over. The northern lakes and rivers always freeze for a period of about 230 days but the more southerly ones become icebound for a

1: Kendrew, W., "The Climates of the Continents," Page 242.

period of only 130 days.[1]

The mild winter conditions of the west coast are due to the location of the peninsula in regard to the Atlantic Ocean and prevailing winds. The peninsula lies to the leeward of the ocean with its warm North Atlantic Drift and directly in the path of the westerly winds. The highland barrier controls the extent to which the modifying influence may be felt, although it is not so high and continuous but that the leeward slopes are also somewhat modified. The Baltic Sea, although on the leeward side, helps to raise temperatures a little.

In summer, the oceanic influence is slight although still apparent. The reason for this will be explained under pressure and winds. Summers are cooler on the coast than in the interior because the ocean now acts as a cooling agent. Practically everywhere July is the warmest month. (Table I, page 5 .) The July isotherm of 60°F. has a normal course running west to east parallel with latitude parallel. (Map II, page 7 .) Temperature conditions at this time depend on altitude and latitude. Temperatures on the west coast are never as high as those toward the east. If Bergen and Oslo are compared again, it will be seen that Bergen records 57.9°F. for the warmest month while the latter records 63.1°F., an increase of 5.2° over the former. This figure is only one half as much warmer than it was colder.

1: Kendrew, W., "The Climates of the Continents," Page 252.

As far north as the Arctic Circle, the Norwegian coast is free from the danger of frost during the three months of the growing season. Stockholm, to the southeast, has four and one half months without frost while Hven, in the Sound, has more than six months. The interior of the peninsula is warmer than the coasts even at a more northerly latitude where the length of summer days and the increased amount of insolation help to maintain remarkably high temperatures.

Nowhere on the peninsula is the yearly range of temperatures extreme, although a gradual but definite increase may be seen from west to east. Bergen and Christiansund, situated on the coast, have a relatively small range, between 20 and 25°. The difference between the warmest and coldest months increases inland so that Trondhjem, at the head of a large fiord, has a larger range. In the interior and on the east coast the range is about 35°, 10° higher than at Trondhjem. This range would be even larger if it were not for the modifying influence of the Baltic.

Rainfall is influenced by the same factors which control temperature. Throughout the whole peninsula rainfall is everywhere abundant enough for agriculture and even in some localities it is too much for good agricultural results. There are great variations in seasonal distribution and regional amounts. Once again there is a marked difference between the west coast and the rest of the peninsula. The heaviest precipitation, usually in the form of a drizzle, falls on the southwestern section of Norway. Bergen has as much as 81 inches a

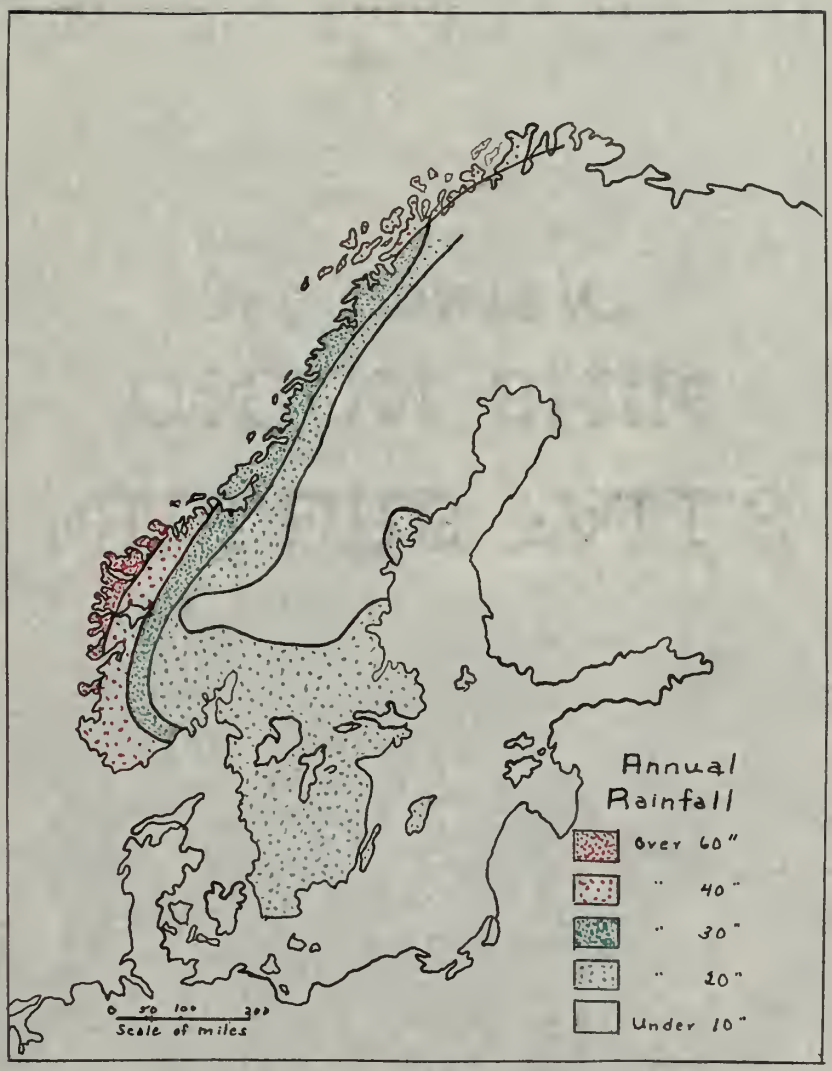
year. The western slopes of the highlands have aboue 100 inches. This copious rainfall decreases northward, however, for Trondhjem receives a yearly amount of only 31 inches. Oslo, which lies in the rain-shadow of the highlands, although situated at the head of a large fiord, receives 23 inches of rainfall a year. The rainfall map on page 12 illustrates these conditions.

Much rain falls at all seasons (Table II, page 13) but along this coast there is a maximum in winter when the cyclonic activity is greatest. Calm weather is rare and during the winter months this is one of the stormiest coasts to be found anywhere. Spring and summer have the least rainfall. The amount of cloud is great and summer fogs are frequent along the coast. This cloudy, foggy weather with much rainfall is disagreeable but it is not unhealthful.

Snowfall occurs least frequently in the south; it is only a temporary interruption of the humid and rainy conditions. At Oslo there are only 50 snowy days out of the 116 days of precipitation, while at North Cape there are 100 days of snowfall. Snow does not remain on the ground for a long period of time.

The cause of this abundant precipitation is due chiefly to the mountains which rise in the course of the prevailing westerlies. As the warm North Atlantic Drift cools when it enters the cold northern waters it gives forth an enormous amount of heat and moisture to the air above it. The westerly winds pick up an abundant store of heat and moisture as they blow over this area and condensation is aided by the frequent pressure-irregularities. The mountains are a high

MAP III



(From I.F. Bogardus "Europe")

MAP III

(From E F Bogardus "Europe")

TABLE II

MEAN RAINFALL (Inches) [1]

Station	Alt. Feet	Jan.	Apr.	July		Oct.	Year
Trondhjem	33'	3.4*	1.8	2.2		3.4*	31.1
Christiansund	49'	5.1	2.4	3.1		5.7*	46.5
Bergen	66'	8.5	4.1	5.8		8.9*	81.0
Oslo	82'	1.1	1.3	3.5	(Aug.)*	2.6	23.2
Östersund	1,010'	0.9	0.9	3.0	" *	1.5	17.8
Hernösand	344'	1.5	1.0	3.1	" *	2.7	23.2

*Heaviest rain fall

1. Kendrew, W.G., "The Climates of the Continents." pp. 298-299

TABLE II

MEAN RAINFALL (Inches) [1]

Station	Alt. Feet	Jan.	Apr.	July	Oct.	Year
Tromsö	33'	6.4*	1.8	3.2	7.4*	31.1
Christiansund	49'	5.1	3.4	3.1	6.7*	46.5
Bergen	66'	8.5	4.1	5.8	8.9*	81.0
Oslo	82'	1.1	1.2	2.5 (Aug.)*	3.6	25.2
Östersund	1,010'	0.9	0.9	3.0 " *	1.5	17.8
Hernösand	344'	1.5	1.0	3.1 " *	2.7	25.2

*Heaviest rain fall

1. Kendrew, W.G., "The Climates of the Continents."
pp. 298-299

enough barrier to cause a heavy precipitation on the western slopes, although not too high so that the rain-shadow area has, in normal years, enough rainfall for agriculture.

Precipitation decreases inland because of the mountain barrier and also because the winds lose their moisture as they penetrate farther inland. There is a gradual variation in the amount of rainfall from north to south. Skåne, in the south, has an average rainfall of 35 inches while Östersund has less than 20 inches a year. Rain falls at all seasons. The seasonal distribution remains quite uniform throughout the year in the northern portion, but the southern and eastern sections have a summer maximum.

Cloudy days are not so frequent here as on the west coast. In the interior, clear and cloudy days are about equally divided while the amount of cloudy weather declines even more toward the east. It is fortunate that there is a minimum of cloud in the summer, so that even though the growing season is short, it is counterbalanced by the length of the summer days and abundant sunshine.

The amount of snowfall, in contrast to rainfall, increases in amount and remains longer on the ground from west to east. On the highlands of southern Norway, snow lies deep and crisp from November to April and above 6000' it remains throughout the year. The ground is snow covered from November to February inclusive around Stockholm and in the interior at

the same latitude, it remains from November to March.[1] The proportion of total precipitation which falls as snow ranges from 36% in the far north to 9% in Skåne. Lower temperatures are responsible for the longer duration of snow.

In addition to temperature and precipitation, the amount of insolation is of great importance to the peninsula. A more northerly latitude is accompanied by a large variation in the length of day and night throughout the year. The location of the peninsula at so great a distance north of the equator renders the amount of possible insolation only about 30 or 40% of what it could be at the equator.[2] Very little cloud in the sky, except on the west coast, gives the region almost the full benefit of the sun's rays. As the following table on page 16 shows, the length of daylight in summer at any latitude over the whole peninsula is such that the actual amount of sunshine then received is often more than in localities at lower latitudes. Summer days are long and winter days are correspondingly short. These extreme periodic variations in the length of days calls for readjustments in human life and work which are sometimes difficult to make.

Before a complete understanding of Scandinavian climate can be reached, it is necessary to study the main atmospheric movements which control and influence temperature

1: Kendrew, W., "The Climates of the Continents," Page 250.

2: Woods, E., "The Baltic Region," Page 3.

TABLE III [1]

Duration of Possible Sunshine in Hours at Various Latitudes

Latitude	55° (Southern tip of Sweden)	60° (Bergen and Stockholm)	65° (Luleå)	40° (Comparison)
Dec. 21	7.2	5.7	3.3	9.3
Mar. 21	12.2	12.2	12.3	12.2
June 21	17.3	18.8	22.1	15.0
Sept. 21	12.3	12.4	12.5	12.3
Average for 3 Summer Mos.	16.7	18.0	20.3	14.7

1. Koeppe, C.E., "The Canadian Climate", p. 3

TABLE III [1]

Duration of Possible Sunshine in Hours at Various Latitudes

Latitude	55° (Southern tip of Sweden)	60° (Bergen and Stockholm)	65° (Lulea)	40° (Comparison)
Dec. 21	7.3	6.7	5.5	9.3
Mar. 21	12.3	12.2	12.3	12.2
June 21	17.5	18.8	22.1	15.0
Sept. 21	12.3	12.4	12.5	12.3
Average for 3 Summer Mos.	16.7	15.0	20.5	14.7

1. Knoppe, C.E., "The Canadian Climate", p. 3

and precipitation. The importance of Scandinavia's location in respect to the prevailing westerlies can now be understood. These winds blow generally from a westerly direction with some variations, i.e. south-west in winter and north-west and west in summer. Their direction is controlled by the high and low pressure centers over the continent and ocean.

There seems to be a tendency toward low atmospheric pressure at about the 60th parallel of latitude, called the Icelandic low-pressure system. From this an off-shoot of low pressure projects to the northeast over Norway. During the winter this low-pressure system is very well developed while in the summer it still persists around Iceland although its intensity is considerably weakened. Another system, of high pressure, is located over the Azores. The direction of the winds and weather conditions are thus controlled by these two systems for "the cold dry air from the high-pressure systems of Greenland and the polar regions meets the warm air from the subtropics and tropics, and the inter-action of the contrasted air masses is seen in the clouded skies, heavy rain, and sudden changes of wind, temperature, and weather, in the numerous deep depressions which move generally from southwest to northeast."[1] In winter the depressions are frequent and are the cause of most of the storms of wind and rain, especially along the west coast. Gales are numerous and average three or four in the winter, but

1: Kendrew, W., "The Climates of the Continents," Page 230.

only one or two in summer. They are comparatively rare in the interior and east coast, for calm weather usually prevails. In summer the depressions are less numerous and less intense in their activity which accounts for the fewer storms at this season.

CHAPTER II

SURFACE FEATURES OF THE SCANDINAVIAN PENINSULA

The present relief and surface features of the peninsula can best be understood by a general survey of part of the geologic history of the region. Furthermore, the study of its historical geology is interesting because of the early connection between the Scandinavian and Canadian shields. Although I shall develop this discussion fully here, it will be further reconsidered in Part Two in connection with the discussion on the maritime provinces of Canada.

The Scandinavian peninsula consists of an old block of Archean rock. This fact is interesting because the Canadian shield, extending over the whole northeastern section of North America, is also of ancient crystalline rock of the same era. It is believed that these two shields were at one time a part of the same land mass known as Atlantica, which occupied the present North Atlantic region. This system was accompanied by enough intrusion and extrusion of igneous rocks for metals to be brought to the crust of the earth. And it is because of these metals that the connection between the two shields is important.

The strata surrounding the two shields are of a later development in the Paleozoic era. In the Scandinavian peninsula, rocks of this period are found overlying the early crystalline rocks to the east and south in the Baltic embayment. In North America they are found in eastern Nova Scotia, Cape Breton, and

New Brunswick. The great Appalachian geosyncline went directly through this area, for it was a belt of low land where epicontinental seas occurred. Marine sediments form greenish, reddish, and black slates and some quartzites. These rocks represent the Cambrian epoch. The great land mass, Atlantica, became the principal source of this clastic material for the European Cambrian strata, while only a portion was the source for that of eastern North America.

Evidence that the two shields were at one time a continuous land mass is found in the similarity of metals and mineral associations, as well as by the presence of identical species of fossils found in the Cambrian sediments surrounding this area. In the rocks dating from the lower Cambrian epoch the trilobite "Holmia" chacterizes the species of these regions. In the middle Cambrian strata, the beds are characterized by various species of "Paradoxides." Neither of these species are found anywhere else in North America.

The similarity of the species in the two periods of the Cambrian epoch from both the Scandinavian and eastern Canadian region can only mean an intermigration of fossil species at one time. Doubtless these marine fossils followed the borders of the great land mass, Atlantica. This explanation seems reasonable that "since invertebrates of this type could not have crossed abyssal ocean depths, and since identity of fossil characters cannot reasonably be assumed to have arisen in isolated regions, we must conclude that a shallow water means of migration

existed"[1] between the two areas.

The great land mass of Atlantica was eroded down to a vast, low-lying peneplain. Then at some period in late geologic time there was a great movement along this shield, accompanied by uplifting and extensive faulting. The whole center of the mass sank to form the Atlantic basin while the two sides were raised. This faulting largely accounts for the almost unique character of the river and coastal topography of Norway. The faulting produced a rias coast, where the coastal structures are at right angles to all other geologic structures. Finally, during the last Ice Age, the whole of Northern Europe and North America were deeply covered by ice. As a result the highlands were scraped bare, while the low lands were covered by glacial debris. At present where the ancient rocks do not themselves form outcrops on the surface, glacial formations of clay, gravel, and sand with their subsequent vegetation and poor drainage cover extensive areas.

Therefore, prior to 1918 no great search for the possibilities of the shield area of Scandinavia had been made because of difficulties involved in prospecting glaciated country. Likewise, in northeastern Canada it was not until recent times that prospecting began. A list of the more important minerals found in both shields is given in Table IV, page 22 . No further statement need be made concerning this comparison excepting the fact that the minerals are identical and are

1: Moore, R., "Historical Geology," Page 132

TABLE IV [1]

Comparison of Mineral Deposits in
the Scandinavian and Canadian Shields

Mineral		
Copper	Scandinavian Shield	Norway- as a by-product in production of pyrite from cupriferous pyrite. Sweden- from the sulphides of pyrite arsenopyrite, pyrrhotite, chalcopyrite.
	Canadian Shield	Ontario and Quebec- from volcanic and sedimentary rocks in mixed sulphides of pyrrhotite, chalcopyrite, sphalerite and pyrite.
Feldspar	Scandinavian Shield	Important source for the wordl.
	Canadian Shield	Important producer and exporter.
Gold	Scandinavian Shield	Boliden district- deposit in cupriferous sulphide ore.
	Canadian Shield	In highly metamorphosed lavas and sedimentary formations, small bodies of intrusive rocks, and along margins of large granitic masses. Quebec- greater part from copper sulphide ores.
Nickel	Scandinavian Shield	Similar to Sudbury of Canadian Shield only smaller and less important
	Canadian Shield	Sudbury deposit- a sulphide. Cupriferous pyrrhotite and chalcopyrite ore in intimate association.
Zinc	Scandinavian Shield	Small amount.
	Canadian Shield	Small amount.

1. Data from Lilley, E.R., "Economic Geology of Mineral Deposits"

TABLE IV [1]

Comparison of Mineral Deposits in
the Scandinavian and Canadian Shields

Mineral		
Copper	Scandinavian Shield	Norway- as a by-product in production of pyrite from cupriferous pyrite. Sweden- from the sulphides of pyrite arsenopyrite, pyrrhotite, chalcopyrite.
	Canadian Shield	Ontario and Quebec- from volcanic and sedimentary rocks in mixed sulphides of pyrrhotite, chalcopyrite, sphalerite and pyrite.
Feldspar	Scandinavian Shield	Important source for the world.
	Canadian Shield	Important producer and exporter.
Gold	Scandinavian Shield	Golden district- deposit in cupriferous sulphide ore.
	Canadian Shield	In highly metamorphosed lavas and sedimentary formations, small bodies of intrusive rocks, and along margins of large granitic masses. Quebec- greater part from copper sulphide ores.
Nickel	Scandinavian Shield	Similar to Sudbury of Canadian Shield only smaller and less important
	Canadian Shield	Sudbury deposit- a sulphide. Cupriferous pyrrhotite and chalcopyrite ore in intimate association.
Zinc	Scandinavian Shield	Small amount.
	Canadian Shield	Small amount.

1. Data from Lilley, E.R., "Economic Geology of Mineral Deposits"

found in the same mineral associations.

The peninsula lacks a variety of minerals and most of what minerals there are, are found in the Scandinavian shield. The value of the ores of the Boliden district is determined both by their content of gold, yielding 32 grams to the ton, and content of copper, although only 2% pure copper, which places it in the same class as ores of the Rouyn district of Quebec. The most important source of feldspars in Europe come from the Scandinavian shield. Both Sweden and Norway are large producers and exporters because of its high reputation for quality. The igneous intrusions also give good quarrying of granite for exportation, although granite is seldom transported unless it has special qualities as in Sweden.

To this group of minerals should also be added minerals of later ages. Most important are the iron ore deposits. Those in Kiruna are of high iron content, about 60% or more pure iron, and they are very easily worked by the open-pit method. The ore bodies are sufficiently close to the oceans so that the ore may be transported profitably by the electric Luleå-to-Narvik railway. The deposit is of large extent, for the known length of the outcrop is three miles with a width of one-to five-hundred feet. The thickness seems to increase with depth, and it is estimated that it furnishes 6% of the total world production.[1] There are also smaller deposits of iron ore in Central Sweden but these

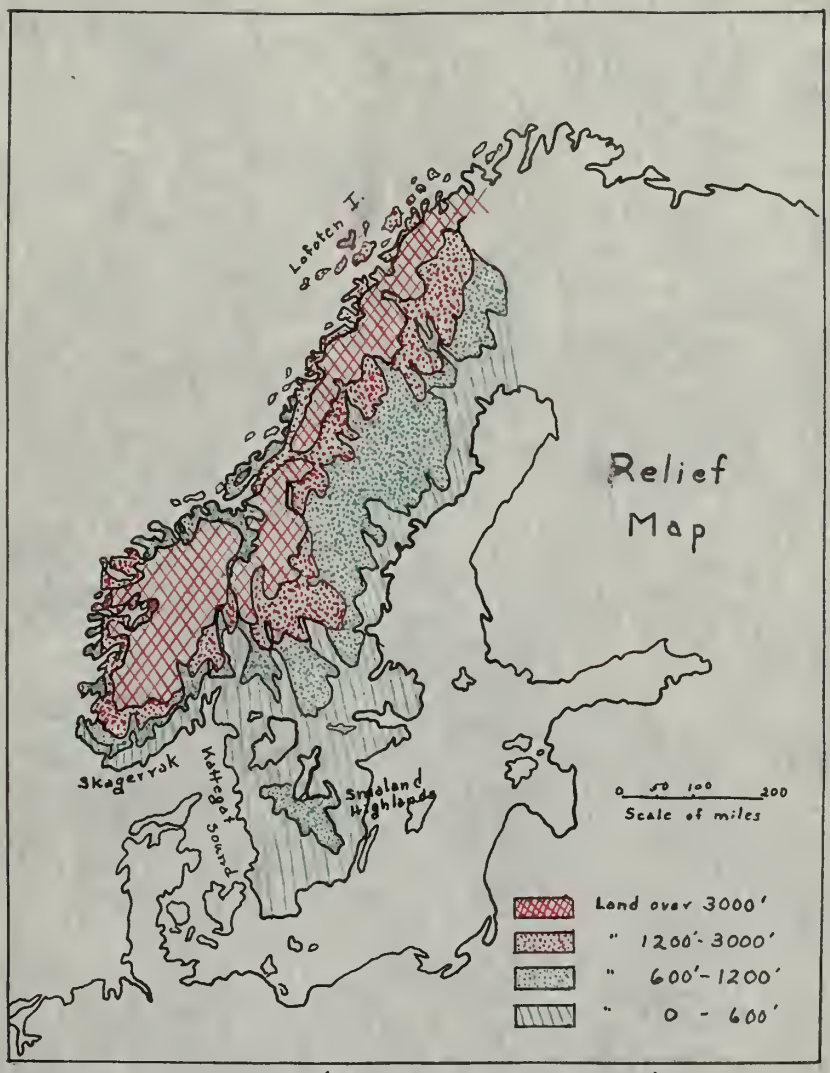
1: Lilley, E., Economic Geology of Mineral Deposits," Page 368.

are used for home industry. Coal deposits of minor extent and importance are located in the southern portion, but these are able to supply only a small percentage of the peninsula's fuel needs.

It is necessary to examine further the results of the last Ice Age in order to understand the present character of the topography of the peninsula. The ancient crystalline block of pre-Cambrian Age forms the backbone of the peninsula. In its last great uplift this block was tilted down toward the south-east in such a way, that the west now has a sudden short and steep slope while the east sinks more gradually by a succession of terraces into the Baltic Sea. (Map IV, page 25.) The uplifted edge of the tilted block has been so worn down by erosion that it forms a broad, deeply dissected plateau as the crest and main watershed between the east and west slopes. One outstanding feature is the lack of definite mountain peaks. This crest which extends almost the entire length of the peninsula is the boundary between the two political units. It has remained unchanged for a good number of years because numerous snowfields and the lack of vegetation make it uninhabitable waste-land.

The rias coastal structure mentioned previously offered lines of resistance to the great weight of the overlying ice-sheet. As a result the west coast is everywhere rugged and high. Many of the depressions were further changed from V to U-shaped valleys. Since the distance from the crest of the mountains to the sea is relatively short, the depressions open

MAP IV



(From I. F. Bogerdus "Europe")

Map IV

directly to the sea, forming large and deep fiords. The walls of these fiords are often nearly perpendicular, rising to one or two miles above sea-level. There is little level land here except where a stream enters the fiord at the landward end, furnishing enough room for a small port on its narrow delta.

The highlands seem to plunge abruptly into the sea and the numerous islands fringing the coast are but a continuation of these highlands. These islands, about 150,000 in all, form the "skerry-guard" between the mainland and the sea. There is little tide along the coast but the Mäelstrom, a tidal current, is often so strong as to be dangerous to the small fishing vessels. The section in the vicinity of the Trondhjem fiord is of a more rolling relief than prevails elsewhere due to the nature of the rocks. Highly developed schists have been eroded more because of their lack of resistance to weathering processes. To the southeast, the Oslo fiord is surrounded by the most extensive lowland to be found anywhere in Norway, although it is still of a hilly nature.

The eastern side of the crest line presents an entirely different landscape. The whole area slopes gently toward the Baltic and glaciation has given a different aspect to the surrounding country. In the north are the usual features of lakes, waterfalls, and numerous rivers. The lakes are long and narrow and the rivers are short and rapid. In the spring they are subject to flooding so serious that they often change their courses. To the southward is the Central Lowlands or lake district. All of the larger lakes are located here, and

the surrounding country presents a gently rolling landscape. Much of the older underlying rocks are deeply covered by glacial debris and outwash material. One of the predominating local features is the eskers, about one to two-hundred feet in height and with a tendency toward a north-northwest direction. Their practical value lies in their excellent water supply and gravel.

The rivers of the south are short and less numerous. Rapids and waterfalls along their courses are utilized for water power. Norway also has its share of lakes and rivers. The lakes are typical of heavily glaciated country and are so deep that many have bottoms far below sea-level. Most of the rivers are swift and steep. They are excellent for water power but of limited value for navigation or means of communication.

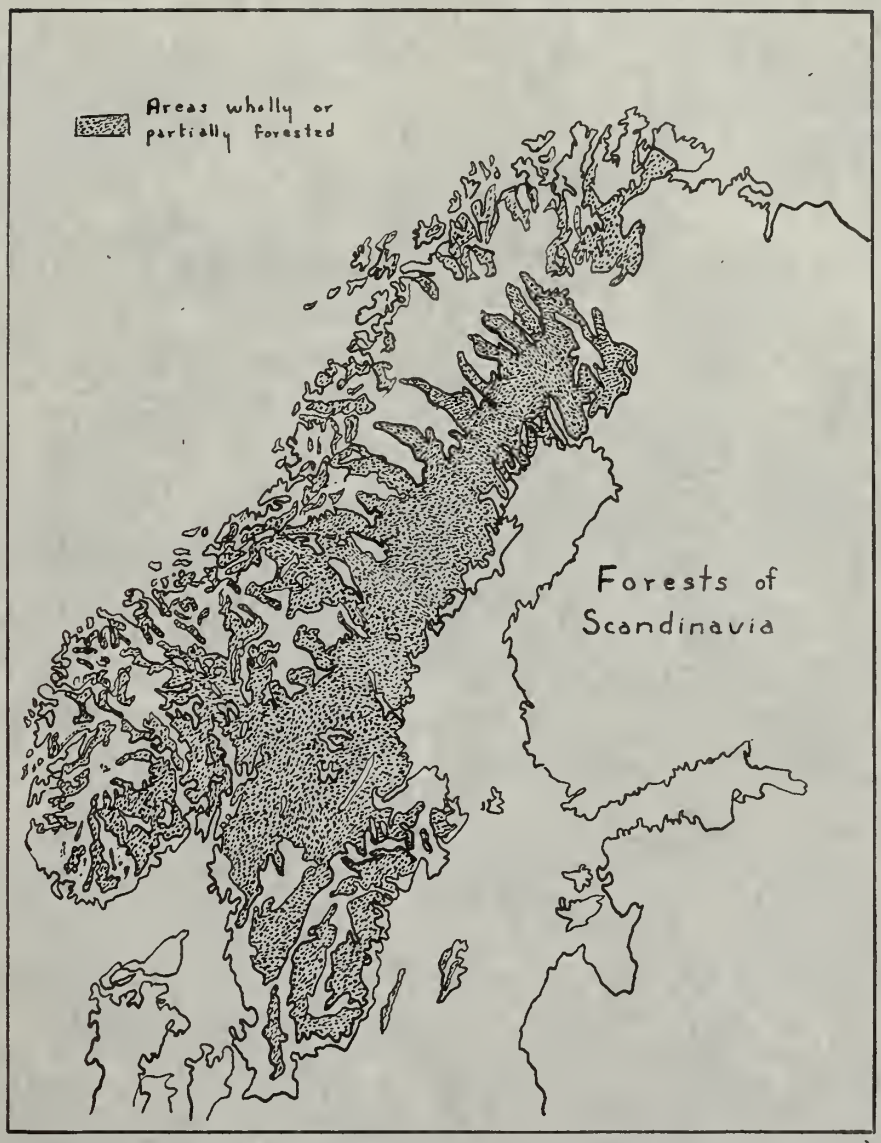
The east and west coasts show a very marked disagreement. The west has one of the most irregular and deeply indented coastlines to be found anywhere, while the east coast is smooth and unbroken, except for wide river mouths which form good, although few, harbors. A good harbor must not only lie in a protected location, but it is advantageous to have large areas of firm flat land adjacent to the harbor's edge. Many of the Norwegian ports have everything that could be required of a good harbor except this. Even the islands on both coasts show a decided contrast. They are rugged but those on the east are always low and often fertile enough to be well wooded, while the western ones are always high and barren. The length of the coastline, disregarding the indentations is about 2,110 miles

long; including the fiords and greater islands, it is probably about 12,000 miles in length.

Soils suitable for agriculture are irregularly distributed over the peninsula, and show definite local variations. Norway has poor, thin, rocky soils in general because the glacier caused denudation rather than deposition of material. There are local exceptions found in the neighborhood of the Trondhjem fiord and near many of the heads of the smaller fiords. The Oslo region has rolling land and better soils than any of the other regions of Norway. The eastern part of the peninsula is better favored with good soil and more extensive level land. The lake district and Skåne constitute a broad fertile belt due to the fact that the late glacial sea submerged the whole area so that thick sheets of clay and sand were widely distributed. The addition of glacial loam increases the fertility of the region. But toward the north, soils suitable for agriculture are found along river banks and the Baltic coast where old marine deposits are located. The interior has thin and rocky soils for the most part but they are suitable for abundant tree growth.

The distribution of natural vegetation presents somewhat the same pattern as that of soils. The whole peninsula is well covered with forests as may be seen in the map on the following page. The richest vegetation is found in a long belt reaching from the southeastern part of Norway into the south of Sweden and extending northward on the eastern side of the highlands. In the south, however, numerous farms are dispersed

MAP V



(From I.F. Bogardus "Europe")

(From I F Bogardus "Europe")

among the woodlands. There are small areas of lesser importance around the fiords on the west coast but otherwise this coast is practically destitute of forests because of the scanty soil, little wind protection, and steep mountain sides.

Conifers determine the character of the vegetation over most of the areas, but in southern Sweden there are also large stands of deciduous trees. In a more northerly latitude and at high altitude, the birch characterizes the type of trees, while on the highlands, tundra conditions persist. These large forest tracts constitute a valuable resource to the peninsula.

CHAPTER III

INFLUENCES OF GEOGRAPHIC CONDITIONS

The Scandinavian peninsula offers an excellent example of the extent to which the size and distribution of a population depend on what the area has to offer and can support. The population is, on the whole, sparse and shows a spotty distribution. Human life on the west coast centers around the fiords for it is only here that there is any appreciable amount of level land at low altitude. The small river deltas at the heads of the fiords furnish enough room for small ports, while hanging valleys at higher altitudes offer some level land for farms and pastures. Of the total population of Norway, two-thirds live on the coast and one-seventh on the islands.[1]

Climate is the principal factor retarding settlement on the highlands for altitude combined with latitude make the temperatures too severe for human habitation. Toward the southeast and extending into southern and central Sweden, there is a wide belt of settlement, where the land changes from a gently rolling character to level plains. Northward along the eastern side of the peninsula small, sporadic settlements hug the narrow coastal plains and river banks. Climate plus limited areas of suitable land again become a handicap to settlement.

The statistics in Table V on page 32 , illustrate how thinly populated the whole peninsula is. The densest

1: Norway Year Book, 1931, page 27.

TABLE V

POPULATION [1]

	Norway	Sweden
Area Sq. Mi.	124,588	173,347
Total Population	2,814,194 (1930)	6,249,489 (1935)
Density per Sq. Mi.	22.59	39.5
Urban %	28.5 (1935)	31 (1926)
Emigration Average per Year	9,000	11,000

1. Data from Statesman's Year Book, 1937, and Foreign Commerce Year Book, 1936

TABLE I

POPULATION I

	Norway	Sweden
Area Sq. Mi.	124,556	173,347
Total Population	2,814,104 (1950)	6,742,400 (1950)
Density per Sq. Mi.	22.59	38.9
Urban %	46.6 (1946)	71 (1945)
Population Average per Year	9,000	11,000

1. Data from Bradshaw's Year Book, 1937, and Foreign Commerce Year Book, 1956

population is found where agriculture and a variety of resources for manufacture or export offer employment and a source of income to a greater number of people. Thus the areas of dense population form a spotty pattern over the peninsula because resources are unevenly distributed.

On the larger fiords of the west coast are found fairly large and dense settlements. The Trondhjem region, for example, has suitable conditions for some agriculture while lumbering and fishing give an additional source of income. The area has a population of over 50,000 people and "large prosperous-looking farms show that man has solved here the problem of living comfortably in a latitude of almost 60°N."[1] The majority of Norwegian people, however, have settled in the vicinity of the Oslo fiord where agriculture, fishing, lumbering, some manufacturing, and activities connected with a large port offer employment to many people.

Similarly, the densest population of Sweden is centered in the central and southern portions. Good climate, good soils, and extensive plains furnish enough agriculture to feed a large population, and a variety of resources for industries enables this part to develop a better balanced economy. Density decreases northward and inland, which is illustrated by the fact that Malmohus Lan had about 296 persons to the square mile in

1: Van Valkenburg, S. and Huntington, E. "Europe," page 243.

1926, and the northern part of the peninsula had only 11.[1]

The population of the entire peninsula is rural rather than urban. In Norway the reason for this may be accounted for by the scarcity of enough level land to hold a large city as well as the lack of a hinterland and resources. Oslo is the only city with a population over 100,000 people, while Bergen and Trondhjem have populations over 50,000. Likewise in Sweden, the most thickly settled portion is where agriculture is the dominant occupation. There are only three cities - Stockholm, the capital, Göteborg, a great trading port, and Malmö opposite Copenhagen - with populations over 100,000 people. Norrköping, a textile city, and Helsingborg have over 50,000 people.[2] Sweden, however, is inclining more toward urbanity because she is becoming industrial and less agricultural.

Emigration from the peninsula has always been high, which is an indication that the area cannot support all of its people. During the period from 1850-1890, a maximum number emigrated chiefly to the United States and Canada. After this period the rate and number of emigrants decreased due to a revival in the number moving into the cities and towns to be employed in the growing industries.

Agriculture is the most important occupation of the

1: Encyclopaedia Britannica, 14th ed., Vol. 21, page 638.

2: Data from Statesman's Year Book, 1937.

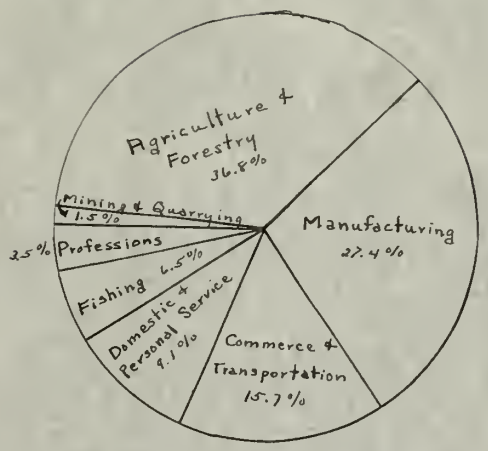
people. The large percentage of the population gainfully employed in this activity is illustrated by the diagram on page 36. More than one-third of the total population are farmers, at least during the farming season, but in almost all cases they supplement this in the winter by some other activity such as fishing, lumbering, or mining. Limited areas with suitable soil tend to make the distribution of arable land irregular. About 50% of the peninsula is unproductive, with most of it on the highlands and northern portion. The only extensive area of level land in Norway is around the Oslo fiord, and on the sides of the larger fiords. Southern Sweden is more fortunate in having large plains of fertile land. Skåne is called the "granary of Sweden" because of this extensive farm land, about 50% of which is under cultivation.

Farms everywhere tend to be small. Those in the west, however, are smaller on the average in acreage than those in the east. It is estimated that about 66% of Norway's farms are less than five acres and 98% are less than twenty-five acres, which means that the land must be intensively cultivated.[1] The people do not live in villages, for their farms cling to the sides of fiords and steep valleys wherever it is possible. Hand labor is the rule due to the fact that the use of machinery is difficult, if not impossible. Machinery is widely used on the plains of southern Sweden, however, although cultivation of the land is still intensive. Farms here are larger than in Norway;

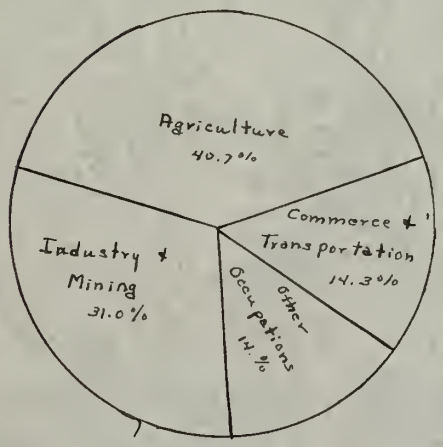
1: Bogardus, J., "Europe, A Geographical Survey," page 182

TABLE VI

Occupations of the Populations of Norway and Sweden [1]

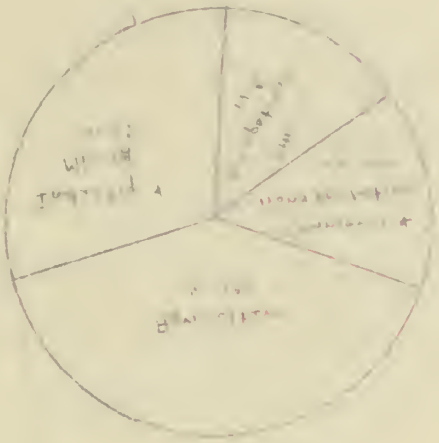


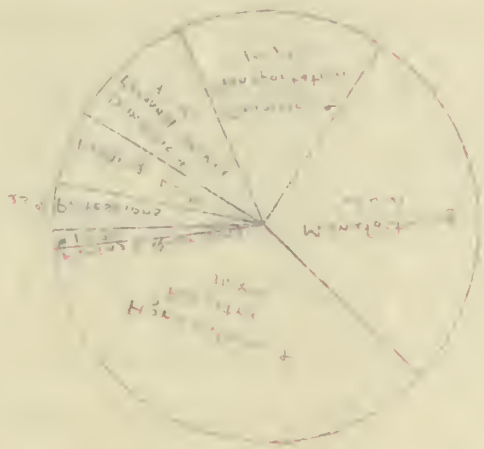
Norway



Sweden

1. Fordardus, I. F. "Europe, A Geographical Survey", pages 186 and 201.





about 45% of them average twenty to one hundred acres, and 33% about twenty acres.[1] Nevertheless, neither country is self-sufficing and therefore must import large amounts of foodstuffs.

Climate is the principal factor which determines what crops can be grown. On the average there are only three months of the growing season with temperatures over 50°F. Latitude carries with it, however, the advantage of increased insolation during the long summer days. There is a minimum of cloud at this season so that the full benefit of long hours of sunshine may be felt. Emphasis must also be placed on soil, for this definitely limits the extent of agricultural areas.

Table VII on the following page shows the type of crops which can best be grown in this northerly latitude. The most important ones are barley, oats, and potatoes. On the extreme west coast, where there is abundant rainfall at all seasons, even these crops are limited, and much of the land is used for hay and pasturage instead. The raising of livestock is of growing importance for the reason that land too steep and poor for agriculture may be used. Dairy products now have a place in the list of exports.

Climate may be too severe for optima conditions for agriculture, but it has endowed the peninsula with large tracts of fine coniferous and deciduous trees, and has thereby offered employment to a large percentage of the population. In most

1: Encyclopaedia Britannica, Vol. 21, page 640.

TABLE VII [1]

CROPS OF SCANDINAVIA

Average for 1935

Crop	Thousands of Acres		Production in Bushels	
	Norway	Sweden	Norway	Sweden
Wheat	75	695	2,094*	21,525*
Rye	15	530	425*	13,891*
Barley	149	255	5,273*	9,175*
Oates	210	1,654	11,797*	85,291*
Mixed Grain	11	638	9**	550**
Potatoes	127	330	34,753*	67,098*
Hay (Sown)	1,273	4,127	2,302**	4,791**
Fodder Roots	46	183	718**	2,753**
Sugar Beets	-	127	-	1,984**

* Thousands of bushels

** Metric ton

1. Data from the Foreign Commerce Year Book, 1936

TABLE VII [1]

CROPS OF SCANDINAVIA

Average for 1935

Crop	Thousands of Acres		Production in Quintals	
	Norway	Sweden	Norway	Sweden
Wheat	75	695	2,304*	21,385*
Rye	15	550	420*	15,931*
Barley	149	255	3,243*	5,175*
Oats	210	1,654	11,797*	85,201*
Mixed Grain	11	659	94*	1500**
Potatoes	127	450	54,750*	87,090*
Hay (Sown)	1,275	4,127	5,302**	4,701**
Fodder Roots	45	183	713**	5,783**
Sugar Beets	-	127	-	1,744*

* Thousands of Quintals

** Metric ton

1. Data from the Foreign Commerce Year Book, 1936

areas agriculture is combined with this activity. Many people are employed in cutting down the trees and preparing the lumber for market. The peninsula has always been a large exporter of both lumber and wood products. The reason for this is its favorable location near the important markets of western Europe. The lumber is easily accessible and the short, swiftly flowing streams, and ice-free fiords of Norway especially, facilitate this activity. Sweden also cuts large tracts annually. Although the streams here are frozen in winter, they are less impeded by falls and rapids. Moreover, a heavier snowfall on this side of the peninsula makes land hauling a simple matter during the winter.

The largest part of the cut lumber goes first to the saw-mills and planing-mills, of which there are over one thousand skirting the coasts. Some of this sawn lumber is exported directly to foreign ports, while the remainder is used in home industries to be made into a more finished product. There is a present trend toward the finished product in all industries, which renders employment to an additional number of people. The forests of the south supply the lumber demands of the box factories, furniture and joinery factories, and match industries. Much wood is still being made into charcoal for the iron and steel industries. Wood-pulp factories supply 14% of the world's total supply of pulp.[1] This figure is decreasing

1: Bogardus, J., "Europe, A Geographical Survey," Page 194.

because much of the pulp is prepared for local industries.

Mining and manufacturing industries employ about one-third of the combined population of Norway and Sweden. This high percentage is due to the present trend of manufacturing and exporting of the finished product in place of the raw material. This high percentage is remarkable when the type and abundance of resources are considered. In the first place, the peninsula lacks one important requirement for large-scale industrialization. There are large and important iron deposits but coal bodies are conspicuously limited, because most of the rocks are too old to contain coal formations. Until the use of coking coal became so important in the manufacture of iron and steel, Sweden was using her forests for charcoal, and large quantities of high quality steel were exported. Today charcoal is still used and some coal is also imported, for the minor coal deposit in central Sweden cannot even supply the peninsula's fuel needs. The future will probably see great strides taken in the use of the electric furnace, for the peninsula has almost unlimited amounts of potential water power. Nevertheless, Sweden remains the exporter of high quality steel, although of only limited amounts.

Iron ore from the northern deposits at Kiruna and Gallivare are almost wholly exported directly to foreign markets by means of the Luleå-to-Narvik railway to the Atlantic. Climate here is too severe to permit any industries to develop, in spite of the fact that these deposits are worked in all seasons. Mining is relatively easy because the open-pit method

can be used, but winter conditions hamper the handling of the ore, which freezes into large chunks. There is also a constant turnover of workers who remain long enough to earn some money. The deposits of central Sweden, on the other hand, supply domestic industries. A belt through this section is the important manufacturing area of the peninsula. Machinery products of all kinds and small articles requiring high quality steel are manufactured here. But even with these industries, Sweden still exports 80% of the ore mined.[1]

Local conditions in Norway favor the development of manufactures demanding raw materials of small bulk but requiring a great deal of power for fabrication. Most industries need a lot of level land for expansion, a requirement which Norway lacks. For this reason electro-chemical and electro-metallurgical industries are becoming important. Many of the short, rapidly flowing streams may easily be harnessed, furnishing enormous amounts of hydro-electric power for these industries. The peninsula possesses one-third of the total potential water-power and one-fourth of that developed on the whole continent of Europe. The west coast has enormous potential possibilities for industry, because of steep falls, high rainfall that is abundant in every season, and the long ice-free fiords which bring ocean transport close to the power sites. The chief handicap to further development is a scarcity of local markets

1: Bogardus, J., "Europe, A Geographical Survey," page 200.

and raw materials, and competition with other regions which are better favored with resources. The east coast, on the other hand has a larger drainage basin although less rainfall, gentle slopes, and streams that freeze in winter. Water power must be supplemented by steam power at this time. The greatest power developments are in the southern portion where population and industries, textiles for example, provide a market for the raw materials. At present some of the surplus power is transmitted and sold to Denmark.

One activity, which is a direct response to the limitations of environment, is the fishing industry, especially along the west coast. Local topography and climate render the area inadequate for any other occupation excepting a little agriculture. The structure of the coast here is favorable for this industry, for the fiords and islands give protection to boats and provide spawning grounds for the fish. Moreover, freedom from ice along this coast allows the fishermen to follow the migrations of the fish. Cold waters, too, provide a good quality fish which can be sold to the more southerly countries of Europe.

Almost all available land provides a foothold for fishing ports with canneries for preparing the fish for market. The whaling industry is of growing importance and Norwegian whaling boats are found in all waters containing whales. (See map on page 74) The people of the east coast are far less dependent on fishing as a source of income. The Baltic Sea, also, is less important, for the amount of fish decrease with

distance from the North Sea. "The presence of abundant fishing grounds draws the people of the nearest coast to their wholesale exploitation, especially if the land resources are scant. Fisheries then become the starting point or permanent basis of a subsequent wide maritime developemnt, by expanding the geographical horizon."[1]

Norwegian tramp steamers are found the world over. These boats serve as carriers for other nations, and numerous steamers ply up and down the coast. For many areas this is the only means of communication and transportation. About one-tenth of the fleet is engaged in coast-wise traffic, another one-tenth is used in shipping between Norway and foreign ports, while the remainder transports commodities to and from other countries.[2] That the eastern slope has more to offer its people may be seen in the fact that Sweden is able to handle only one-half of its transport tonnage.

Inland transportation is under serious difficulties. Only in the southeast, where land is level, is there any extensive network of roads and railroads. There are only three railroad lines which cross the highlands, due to the fact that such roads are expensive to build, and deeply dissected land offers innumerable barriers. Nevertheless, the mileage of

1: Semple, E., "Influences of Geographic Environment," page 330.

2: Encyclopaedia Britannica, Vol. 16, page 549.

railroad in proportion to population is very large.

The Scandinavian people carry on important and extensive trade with other areas the world over. Although the peninsula offers only limited resources for exchange, the people have made remarkable use of their opportunities, for imports and exports usually balance. The skill of the people has been somewhat more important than the presence of raw materials. Labor is well-paid and efficient, and output per worker is above the European average.

The southern and central parts of the peninsula are situated in Europe A, where culture, health, national income, and standards of living are highest. The remainder of the peninsula is considered to be in Europe B, where environment is too severe for optima conditions to prevail. The people have been leaders "in economic and cultural activities, and today constitute one of the most progressive nations of Europe."1

1: Bogardus, J., "Europe, A Geographical Survey," page 192.

Part II

Areas in Other Continents with Similar Geographic Environments and Influences as the Scandinavian Peninsula

INTRODUCTION

Before I analyze those areas which I consider to be similar to the Scandinavian peninsula in physical geographic conditions, I shall merely list them here and refer to the accompanying map on page 47. The areas under consideration are outlined in red.

Map A:

Hokkaido, the northern island of Japan

Karafuto, the south half of Sakhalin Island

Kamchatka peninsula, south coast

Alaska, south coast

British Columbia, west coast inland to the mountains and north of Vancouver Island.

Map B:

The Maritime Provinces - Nova Scotia, New Brunswick, Prince Edward Island.

Newfoundland, the island only

Iceland, southwest coast

Scotland, the Highlands and Northern islands

Denmark

The Baltic States - Lithuania, Latvia, Estonia

Finland, southern portion

(Map A)
Nemuro (3)
Kushiro (1)
Dutch Harbor (2)
Kodiak (4)
Sitka (6)
Juneau (5)
Port Simpson (7)
Location of Areas (Map B)
(8) Southwest Point
St. John (12)
Charlottetown (9)
Sable Is. (11)
Halifax (10)
Vestmanno (13)
Deer ness (14)
Leningrad (16)
Riga (17)
Copenhagen (15)
Konings berg (18)

MAP VI

TABLE VIII

MEAN TEMPERATURE (F°.) [1]

Map A

Station	Coldest Month	Warmest Month	Year	Range
1. Sapporo	20.3 (Jan.)	69.3 (Aug.)	44.2	49.0
2. Nemuro	23.0 "	62.6 "	45.5	39.6
3. Dutch Harbor	31.8 (Dec.)	51.4 (July)	39.8	19.6
4. Kodiak	28.7 (Jan.)	54.5 "	40.6	25.8
5. Juneau	26.7 "	57.4 "	42.0	30.7
6. Sitka	31.7 "	55.5 (Aug.)	43.6	23.8
7. Port Simpson	34.0 "	56.7 "	44.8	22.7

Map B

Station	Coldest Month	Warmest Month	Year	Range
8. Southwest Point (Anticosti Island)	12.3 (Jan.)	56.8 (July)	35.1	44.5
9. Charlottetown	14.7 "	65.3 "	41.3	50.6
10. Halifax	23.0 "	64.8 "	43.8	41.8
11. Sable Island	28.7 (Feb.)	63.1 (Aug.)	44.7	34.4
12. St. John	22.0 "	59.1 "	40.5	37.1
13. Vestmanno	34.7 (Jan.)	52.7 (July)	42.2	18.0
14. Orkney	39.0 "	53.5 "	45.3	14.5
15. Copenhagen	31.8 (Feb.)	61.9 "	45.9	30.1
16. Leningrad	18.1 "	63.5 "	39.4	45.4
17. Riga	24.3 (Jan.)	64.0 "	43.0	39.7
18. Koningsberg	27.0 "	63.3 "	44.6	36.3

1. Data from Kendrew, W., "The Climate of the Continents" and Clayton, H. H., "World Weather Records"

TABLE VIII

MEAN TEMPERATURES (°C.)

Map A

Station	Coldest Month		Warmest Month		Year	Range
1. Sanpedro	20.3	(Jan.)	40.3	(Aug.)	14.3	41.0
2. Tenuro	23.0	"	52.6	"	46.5	36.6
3. [illegible]	31.8	(Feb.)	61.4	(July)	72.4	29.6
4. Koalak	28.7	(Jan.)	54.6	"	40.6	25.8
5. Jamiaz	25.7	"	51.4	"	42.0	30.7
6. Gilda	31.7	"	55.5	(Aug.)	43.6	23.8
7. Fort Simpson	34.0	"	58.7	"	44.6	22.7

Map B

Station	Coldest Month		Warmest Month		Year	Range
8. Northwest Point (Antigonti Island)	12.3	(Jan.)	56.8	(July)	34.1	44.5
9. Charlottetown	14.7	"	65.3	"	41.3	50.6
10. Halifax	25.0	"	64.3	"	45.0	39.3
11. Seale Island	29.7	(Feb.)	63.1	(Aug.)	46.7	34.4
12. St. John	29.0	"	59.1	"	40.6	30.1
13. Montmagny	34.7	(Jan.)	62.7	(July)	43.2	28.0
14. Quebec	30.0	"	56.3	"	40.3	26.3
15. Copenhagen	31.8	(Feb.)	61.8	"	45.9	30.1
16. Limestead	13.1	"	63.8	"	39.4	46.4
17. Otaga	24.3	(Jan.)	64.0	"	45.0	39.7
18. Koningsberg	27.0	"	63.3	"	44.6	36.3

1. Data from Lemstrom, W., "The Climate of the Northern and Eastern, H. S., "World Weather Records"

CHAPTER IV

CLIMATE

In Part One, climate was found to be the most important factor influencing the physical environment of the Scandinavian peninsula, and thereby either directly or indirectly influencing the lives and activities of the people. For this reason, climate has been chosen as the fundamental basis for comparison.

Two types of conditions, with minor variations, characterize the climate of the Scandinavian peninsula. One type is marine, with mild winters and cool summers; the other, a transition between marine and continental conditions, has colder winters and warm summers. A general summary of the Scandinavian climatic conditions is feasible at this time.

Temperatures are considerably high for the latitude, because of the modifying influence of the ocean and North Atlantic Drift, the location in the path of the prevailing westerlies, which carry these influences inland, and the increased amount of insolation in summer. The mountains are a barrier to the modifying influences and become an arbitrary division between the two climatic regions. Precipitation is abundant everywhere and the coast to the leeward of the prevailing winds has both a greater seasonal and yearly distribution. Cyclonic storms are important in bringing about frequent changes of weather. Snowfall is heavier and of longer duration where the

area is farther removed from the modifying influence of the winds. The amount of cloud is great on the windward coast but decreases inland.

The areas listed on page 46 conform to these requirements but with some modifications. Since some of these areas are small in extent, they may not show all of the conditions which characterize the Scandinavian peninsula. Denmark, for example, resembles the southeast part of the peninsula only, while the south Alaska coast duplicates the Norwegian coast. The map on page 47 and Table VIII, page 48 , give a few selected stations of these areas, with recordings of their warmest and coldest months, yearly average, and range of temperatures. If Table VIII is compared with Table I, page 5 , a few comparisons can be made.

Most of the stations record lower temperatures for their coldest months than Table I shows. Likewise, they record higher temperatures for their warmest months, and the range tends to be less uniform. The range in Table I varies from 19° to 39°, while that in Table VIII varies between 15° and 50°. The seasonal temperatures stabilize each other enough so that the yearly average is about the same for all stations. On the whole, temperatures compare well enough for these areas to be considered for further analysis.

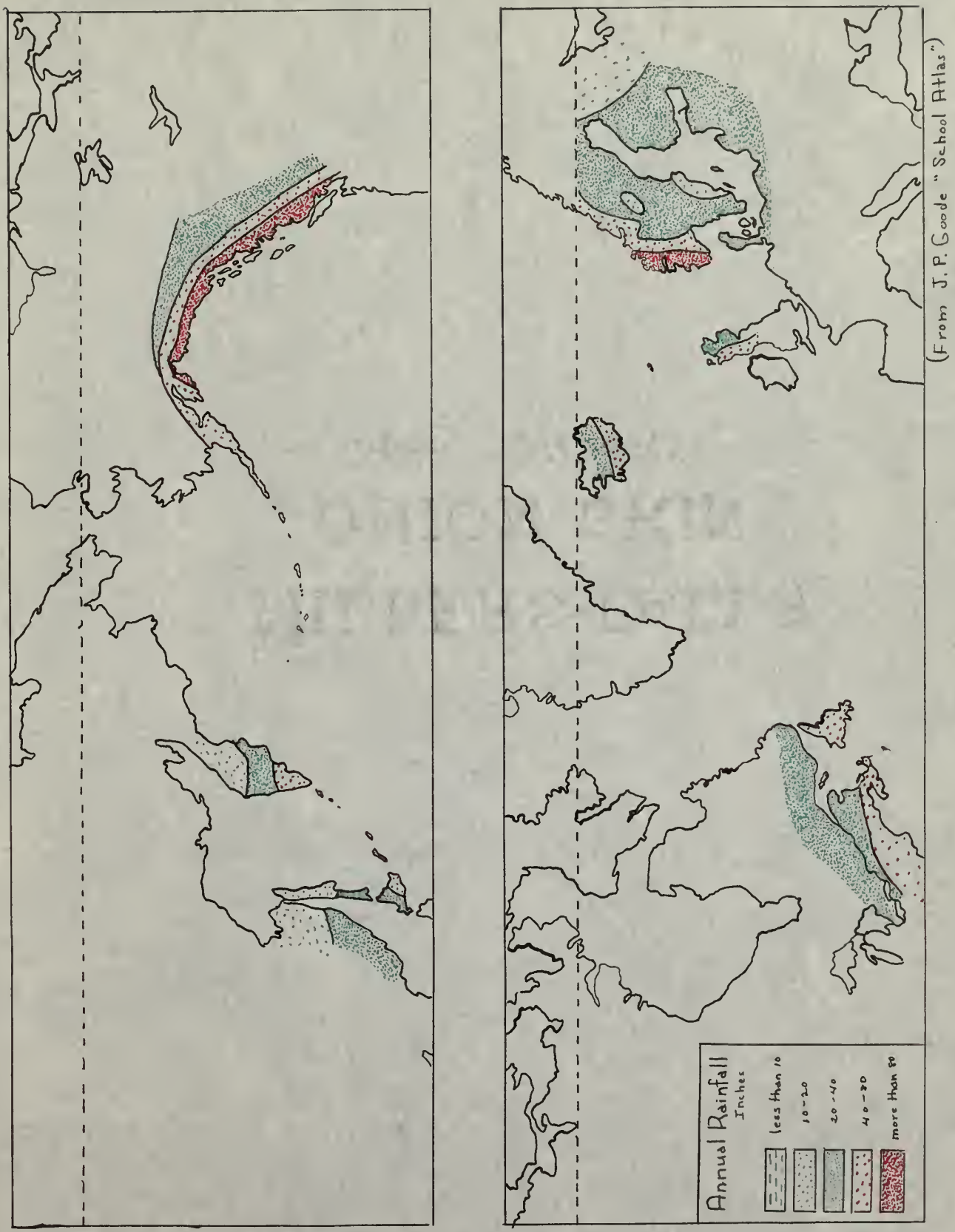
The Scandinavian peninsula has three months of the growing season without danger of frost, excepting in the north. Frost data is important because of its influence on agriculture.

Three months growing period without danger of frost is necessary for most crops. In the Maritime Provinces, the cyclonic storms sometimes cause great economic losses when an unusually late spring frost or an early autumn frost may destroy valuable crops in a few hours. They are not to be expected in July and August, however. Since agriculture is of minor importance in Newfoundland, the frost-free period is of limited concern. On the Pacific coast, the period is of short duration. Crops are definitely limited in Iceland because of the danger of frost in every month during the summer.

If the annual rainfall of these areas is compared with that of the peninsula, as illustrated on Map VII, page 52 , it will be seen that every area has abundant rainfall for the year. Those coasts washed by warm currents and exposed to the prevailing winds, have a heavier rainfall during all seasons than areas farther removed from these oceanic influences. The west coast of the North American area is identical with the peninsula. The following Maps VIII, IX, X, and XI show the average seasonal rainfall. This time the Pacific Coast of North America, the Highlands of Scotland, and Iceland are identical with the west coast of the peninsula only. These areas have a pronounced late fall and winter maximum, while the remaining regions have their greatest rainfall during the spring and summer, a typical east-coast condition, and comparable to the seasonal maximum of the eastern slope of the peninsula.

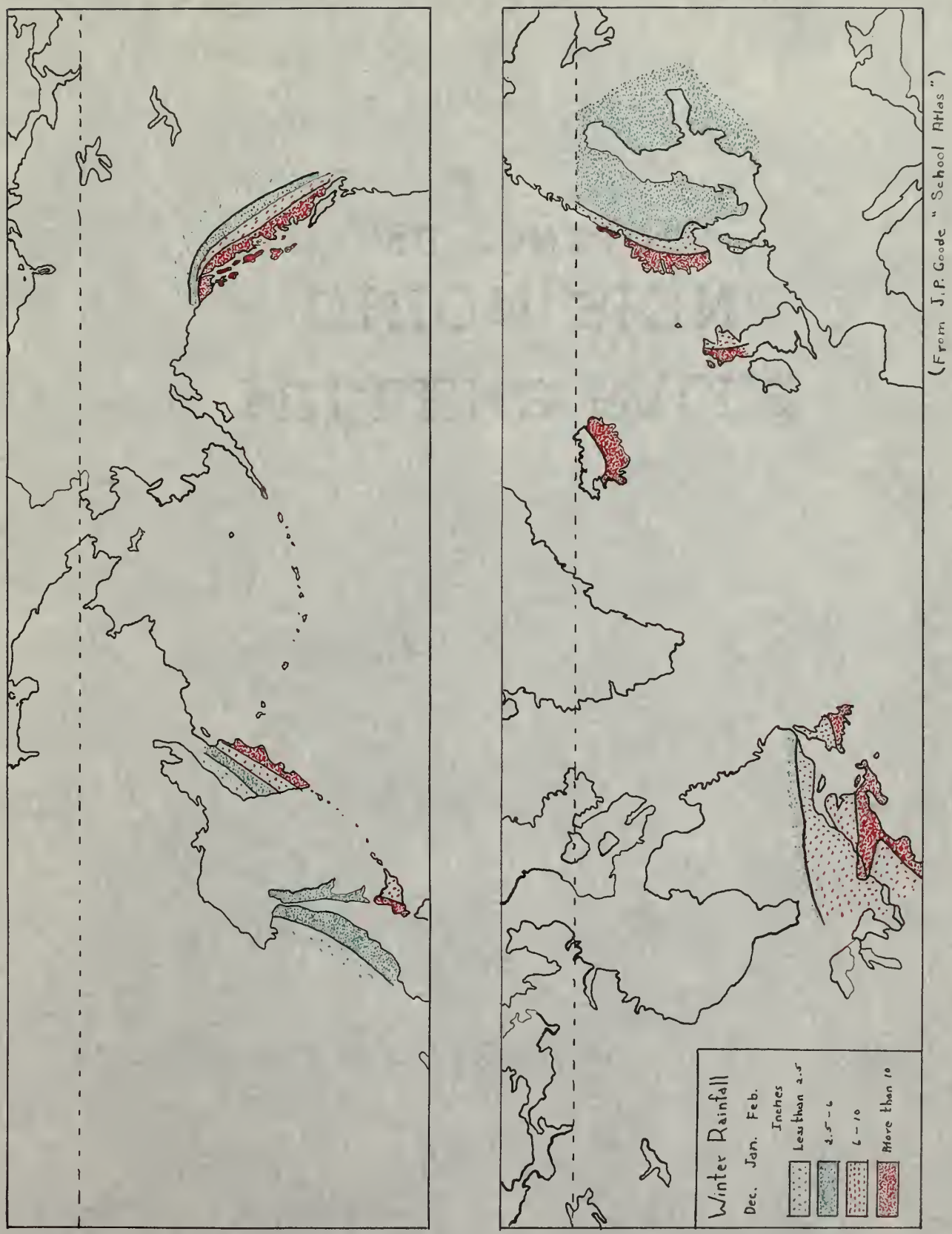
The Maritime Provinces and Newfoundland are an exception to this, however, because they also have an abundant winter

MAP VII

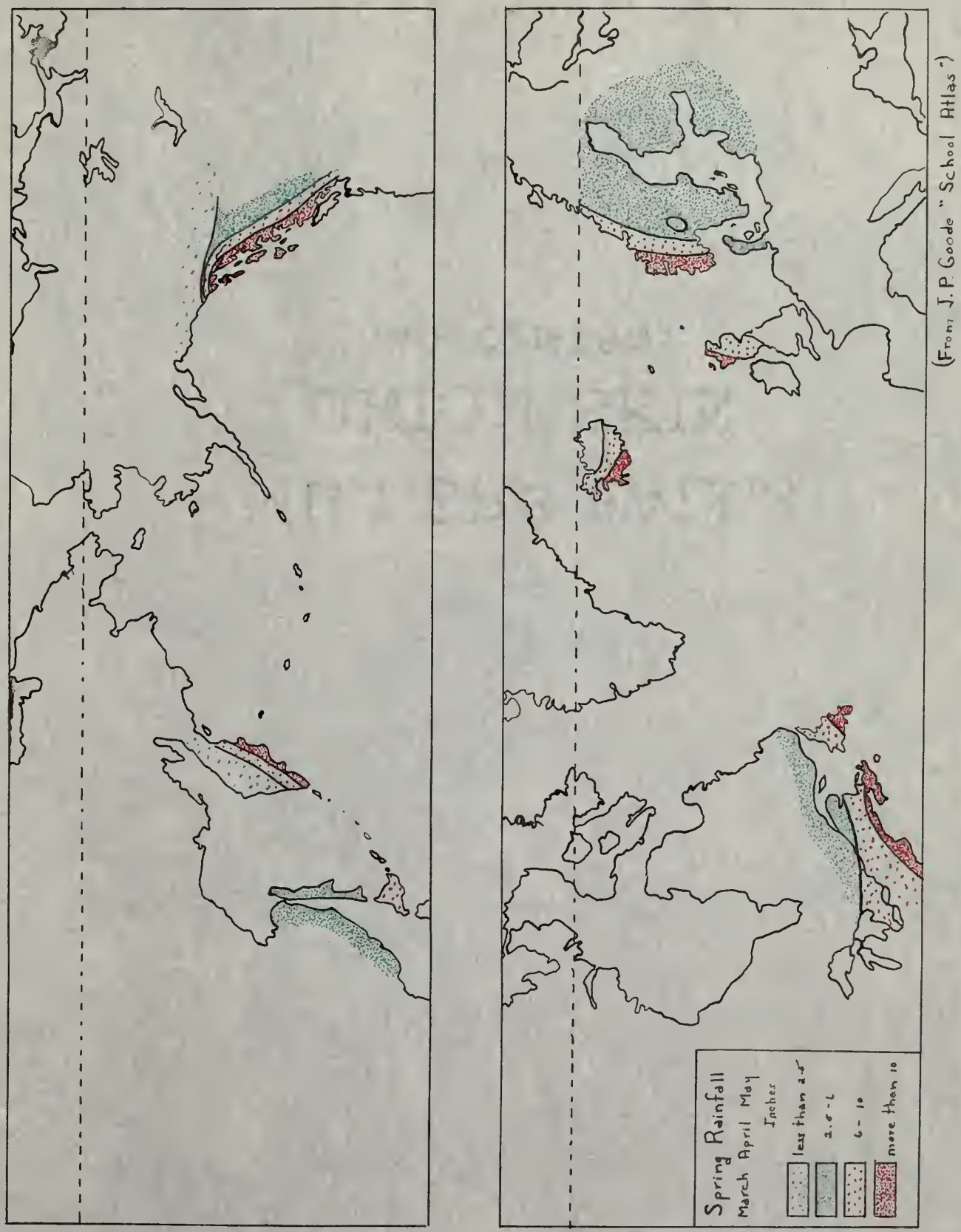

Annual Rainfall
Inches
less than 10
10-20
20-40
40-80
more than 80
(From J.P. Goode "School Atlas")

Tsunami Risk Index
Low
10 – 20
20 – 30
30 – 40
40 – 50
High

MAP VIII

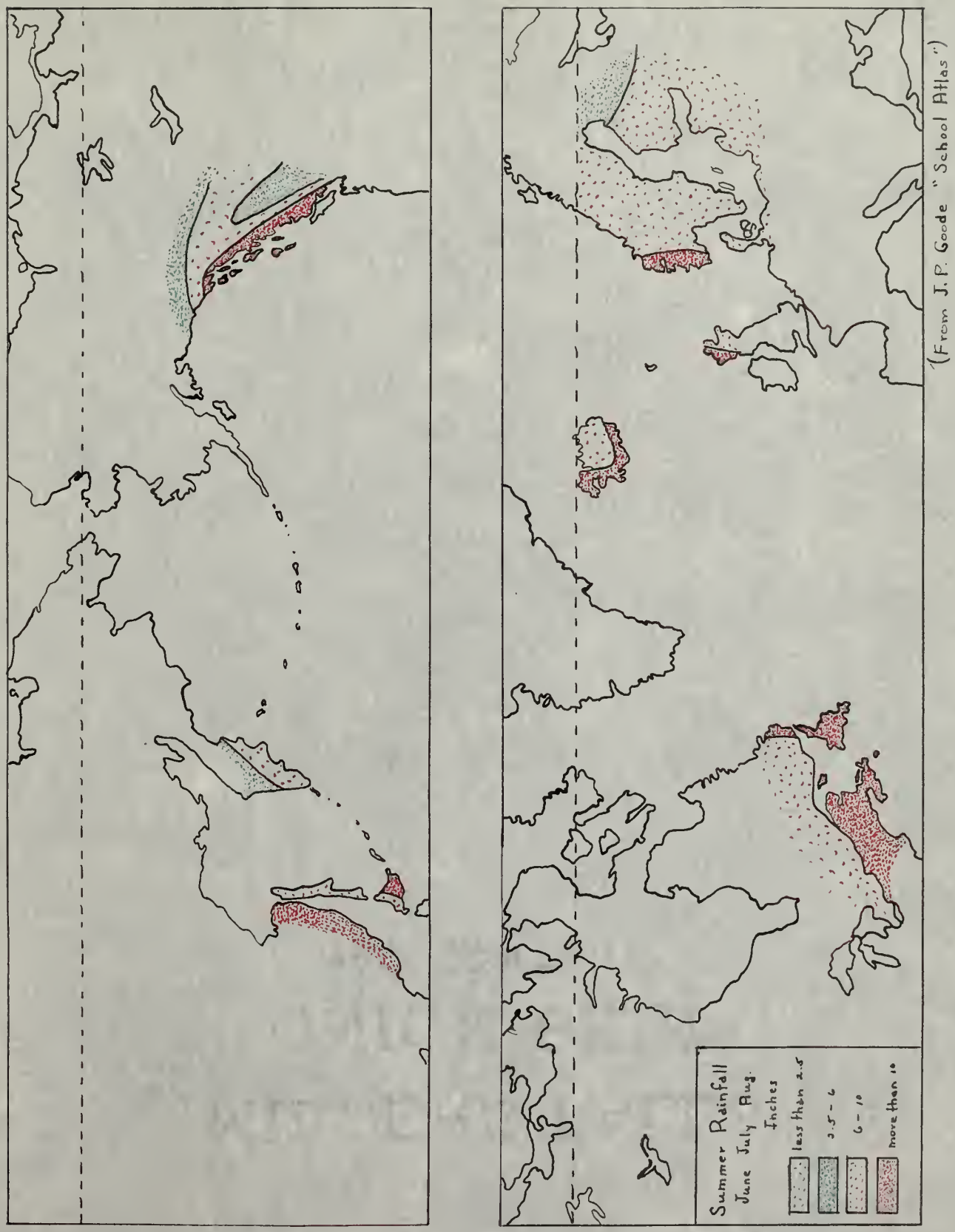

Winter Rainfall
Dec. Jan. Feb.
Inches
Less than 2.5
2.5 - 4
4 - 10
More than 10
(From J.P. Goode "School Atlas")

MAP IX



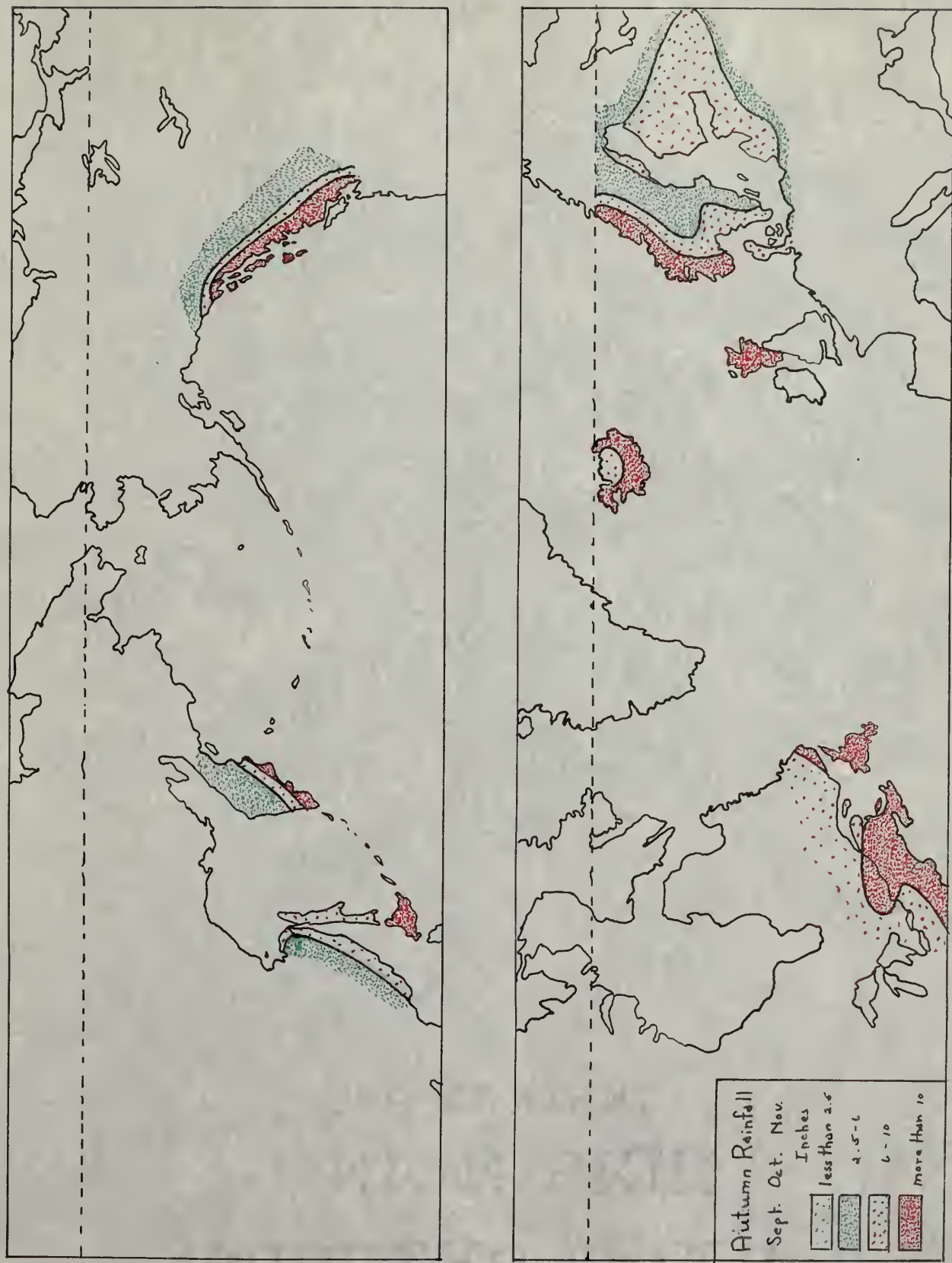
(From J.P. Goode "School Atlas")

MAP X



(From J.P. Goode "School Atlas")

MAP XI



(From J. P. Goode "School Atlas")

rainfall caused by the presence of the Great Lakes, the Gulf of St. Lawrence, and the warm Gulf Stream. Humidity and warmth from these water bodies cause a path of cyclonic activity along their course, which brings a great deal of precipitation to the region.

All areas receive some snowfall, although here again there are variations. The Scandinavian west coast has heavy precipitation during the winter, but snowfall is infrequent and of short duration. The eastern slope, however, has more frequent snowfall and of long duration. Similarly, along the immediate northeast Pacific coast, winter temperatures are too warm to permit much snowfall. The region of heaviest snowfall here is in the mountain districts, where most of the points above 4000 feet report 100 inches. On the Scottish Highlands, another west-coast area, snow is often deep and remains a long time because of high altitude. At Aberdeen, on the east coast, the ground is covered for 34 days in an average year. Denmark has but little snowfall, which remains for a few days. The Baltic States lie in the same transitional climatic zone as Sweden, although nearer to continental conditions, so that climate is never constant. Winters may be very severe with a great deal of snow; or mild, with only a light snow covering. Finland also lies in this zone of transition, but a northerly latitude and a limited influence from the Baltic result in a snow covering which remains from early November to late April.

The Maritime Provinces on the east coast have abundant snowfall. The amount varies with distance from the sea as well

as with latitude. It is variable from year to year and it is not unusual for one month to have almost half of what is received normally in a whole year. The other east-coast regions - Hokkaido, Karafuto, and Kamchatka - have abundant snowfall. Hokkaido has snow near sea-level on the north and east parts of the island, where the influence from the Kuro Shio is least felt.

The Scandinavian peninsula has a high percentage of cloud, especially on the west coast, which is greatest during the winter. This helps to keep the amount of radiation low and consequently keeps the temperatures from falling excessively low. The west coast has so much rain and cloudy weather all year round, that agriculture is difficult. The Scottish Highlands are even more unfortunate in the amount of sunshine they receive. The average for the year is only 3½ hours per day of bright sunshine. In December there is less than one hour a day on the average and the only part which receives over one hour a day of sunshine is a strip of the east coast extending south from the Moray Firth. In June, fortunately, the whole area receives, on the average, more than 5½ hours of sunshine a day.[1]

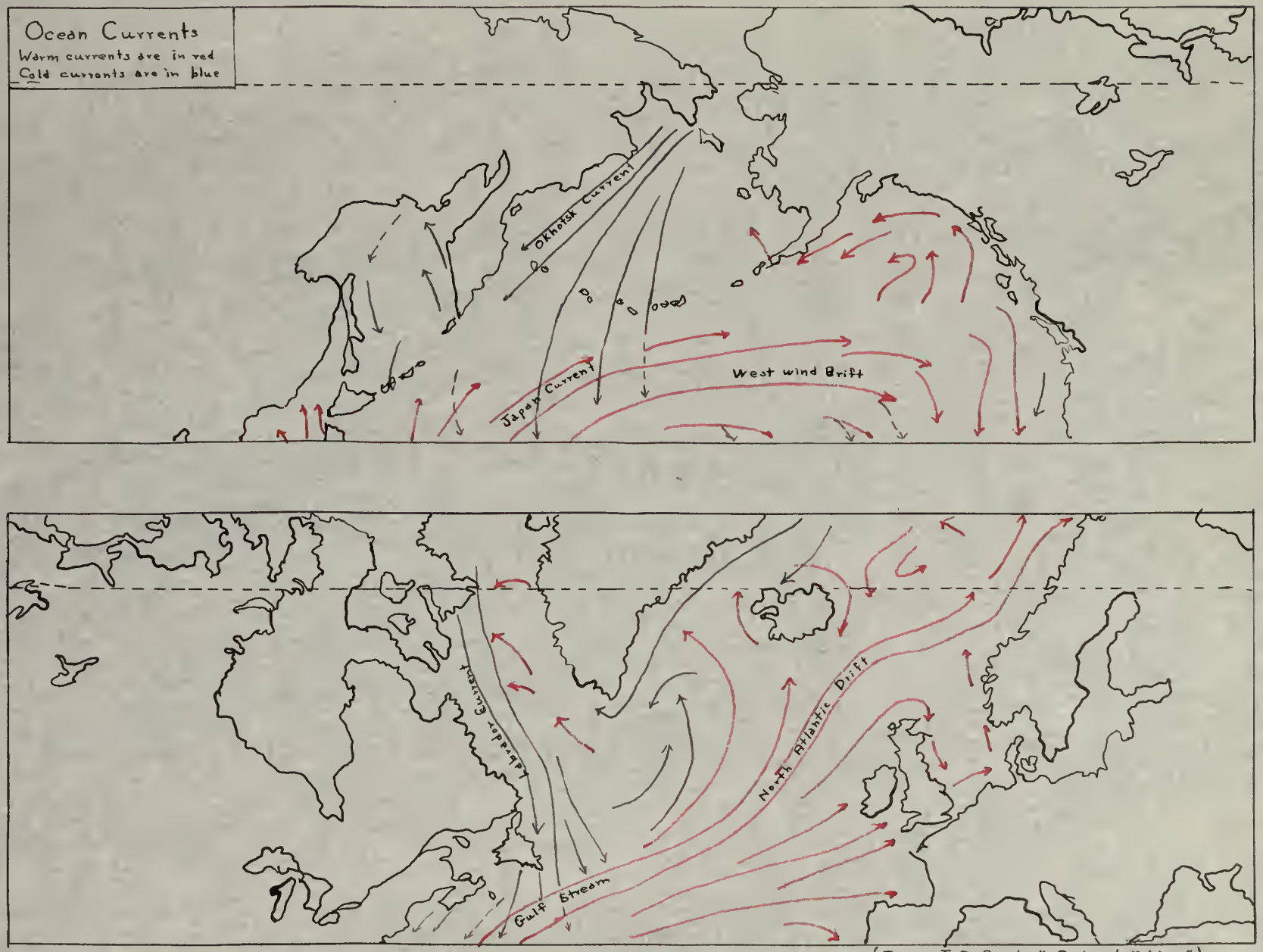
The reasons why these temperature and rainfall conditions compare so well for all areas can best be shown by observing a few of the following maps. In the first place, the configuration of the coastline is irregular and deeply indented, so that all areas under discussion are in close proximity to

1: Ogilvie, A., "Great Britain, Essays in Regional Geography," page 7.

marine influences. The Baltic States and Finland, however, are located on what may be considered as an inland sea and consequently, the modifying influences are less prevalent.

Ocean currents and prevailing winds are, in most cases, responsible for these modifications on the Scandinavian peninsula. Map XII, page 60, show the directions of the warm and cold currents in the north Atlantic and Pacific oceans. The Gulf Stream and North Atlantic Drift carry warm waters from the equatorial region northward. This warm current flows parallel to the eastern coast of the southern states, but, before it reaches the Maritime Provinces, it swerves to the eastern part of the Atlantic, to follow the coast as far north as the Arctic Ocean. A branch of the current encircles Iceland. A similar current in the Pacific, the Kuro Shio, bathes the southern shores of Hokkaido before it crosses the ocean to the coasts of British Columbia and southern Alaska. The influence of this current is not so strong because it loses a part of its warmth when it crosses the larger Pacific Ocean. These currents tend to make the west-coast temperatures warmer in winter, while, in summer, they act as a cooling agent. Summer temperatures are, therefore, not as high as they might be without this influence.

The areas on the east sides of the two continents are less fortunate than those on the west, for they are only moderately influenced on their southern shores by the warm currents. Their northern shores are washed by the cold currents, the Labrador and Okhotsk currents, from the Arctic Ocean. When



(From J.P. Goode "School Atlas")

MAP XII

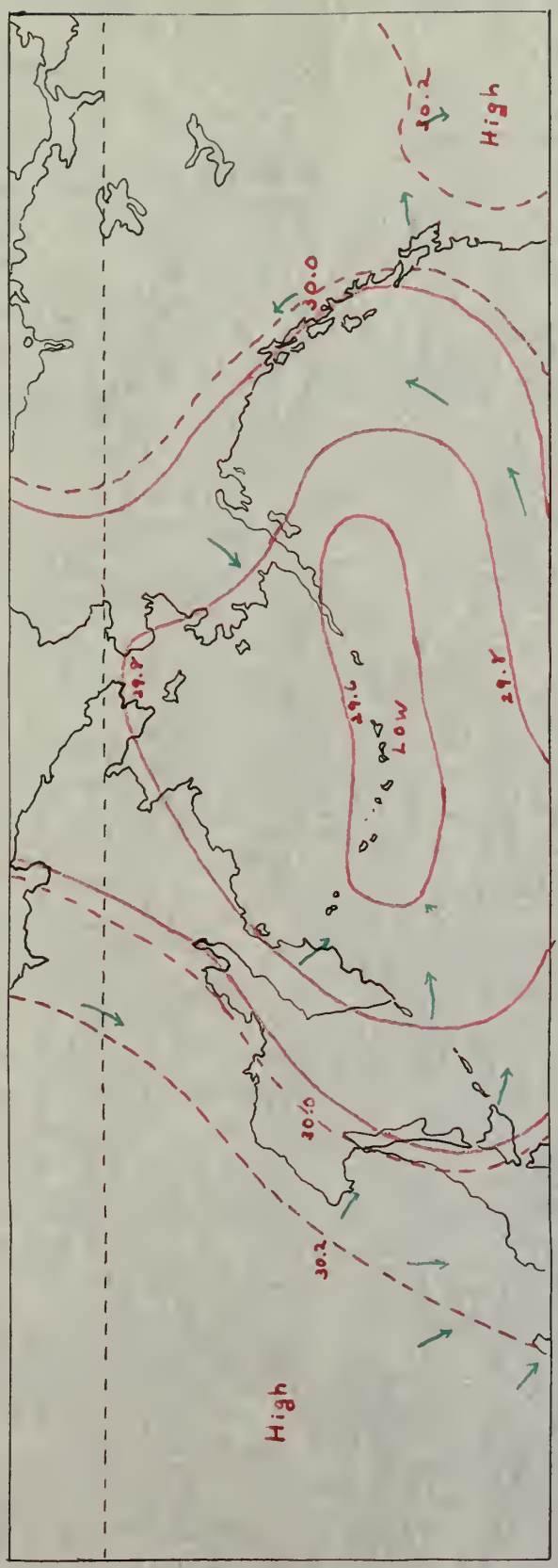
Ocean Currents

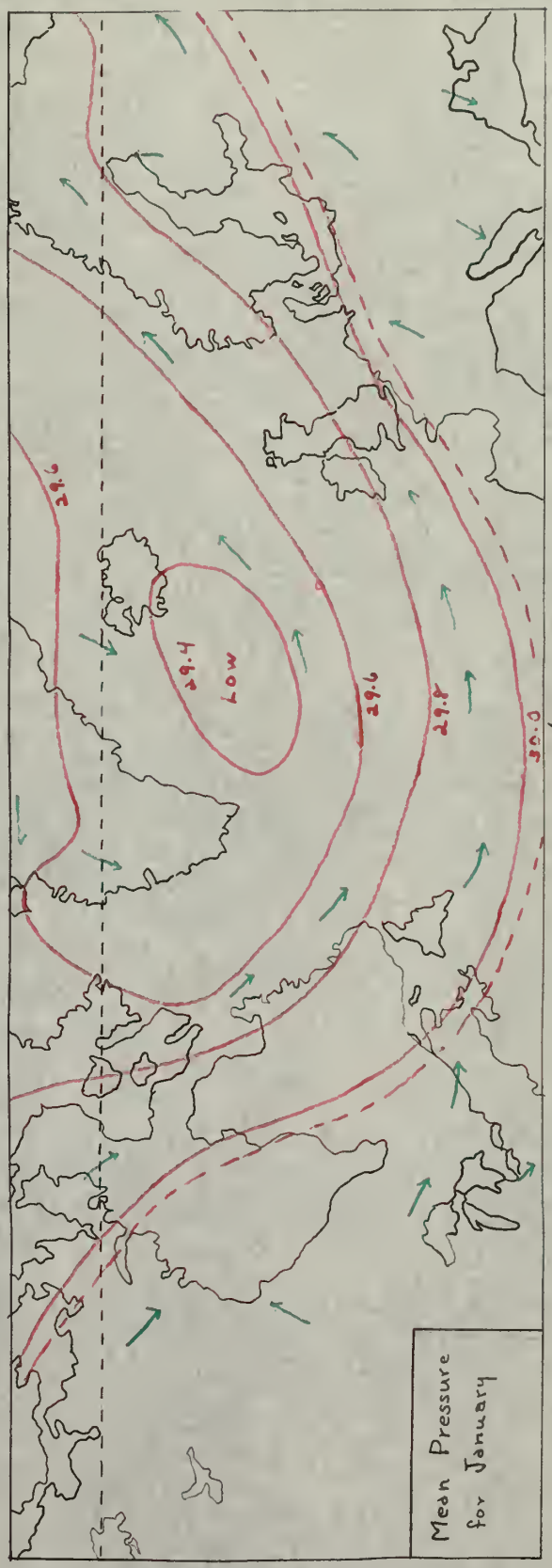
the warm and cold currents meet, they tend to counterbalance each other. For this reason temperatures are not as high nor as low as they might be. In the winter, the waters, warm or cold, which surround the Maritime Provinces are above the freezing point and so seem to keep the temperatures well above the normal for that latitude. In summer, the cold waters filled with drift ice, plus the tendency toward cold bank waters where the two currents meet keep the area almost constantly cool. For the same reason, Hokkaido is little benefited by the warm Kuro Shio current, for the largest portion flows to the east side of the island which is in lee of the prevailing winds in winter. The cold Okhotsk current results in the same conditions here as the Labrador current on the Maritime Provinces, although the sea around the island is subject to freezing.

There is probably no weather condition which occasions greater inconvenience to the mariner than the dense fogs which occur where the warm currents meet the cooler waters. In late spring and early summer most frequent and dense fogs envelop the regions of the Grand Banks, east of Hokkaido, and the west coast of Scandinavia.

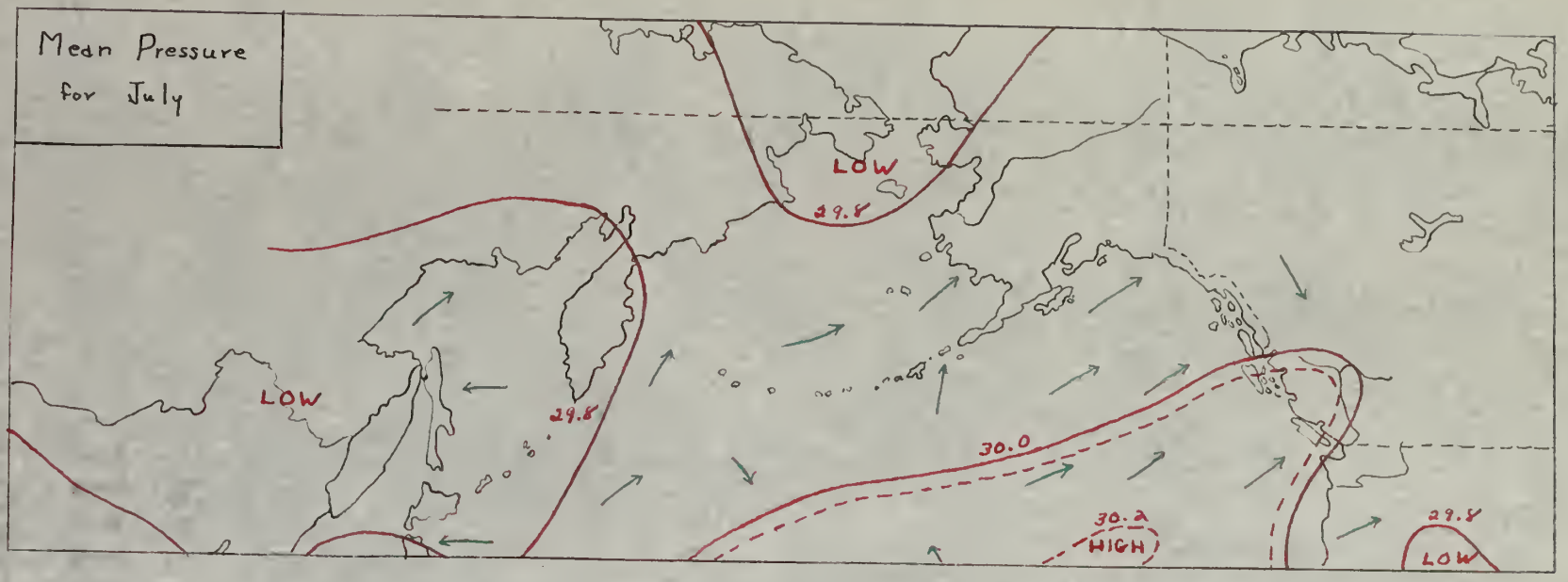
Winds, which carry the modifying influences, are caused by the high and low atmospheric pressure systems. Those of the North Atlantic region were discussed in connection with the winds of the peninsula. Map XIII illustrates these pressure-systems for January; and Map XIV, those for July. The Pacific high and low pressure systems are somewhat the same, because of the same relation of land and water bodies to each other. The

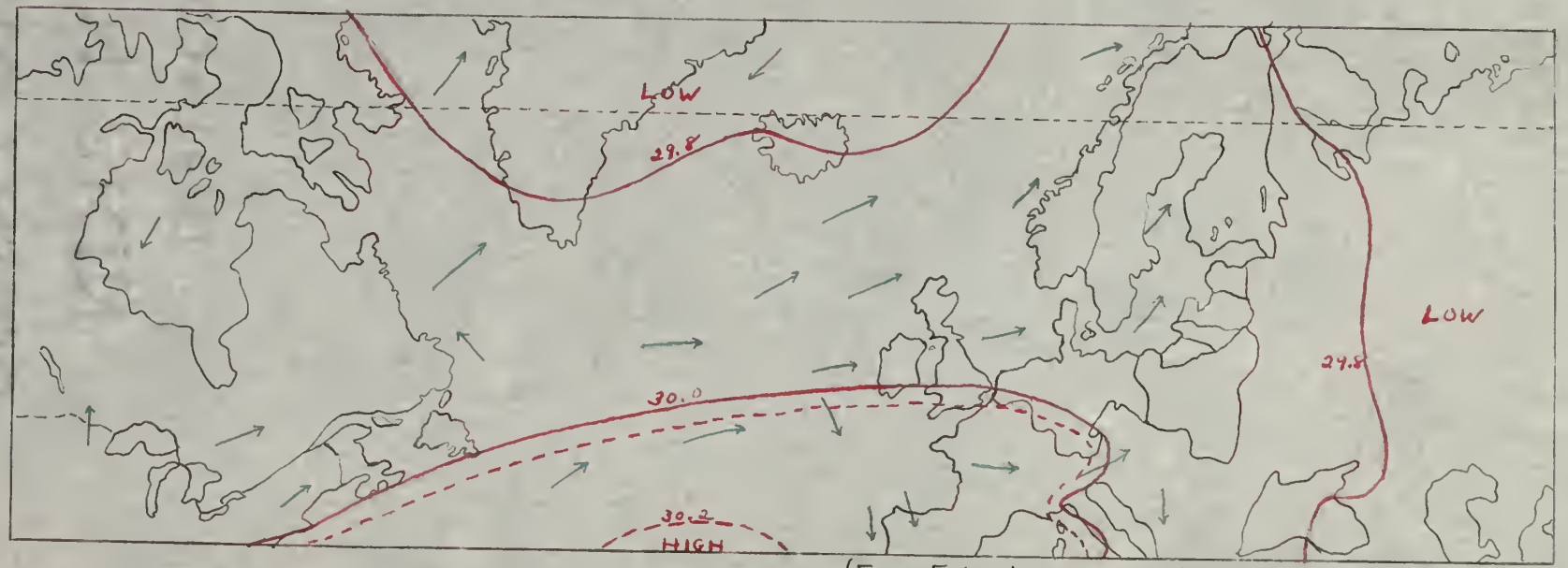
MAP XIII





(From E. Huntington and S. Cushing "Principles of Human Geography")





(From E. Huntington and S. Cushing "Principles of Human Geography")

MAP XIV

Human Geography
(Part I Human Activities and Occupations)

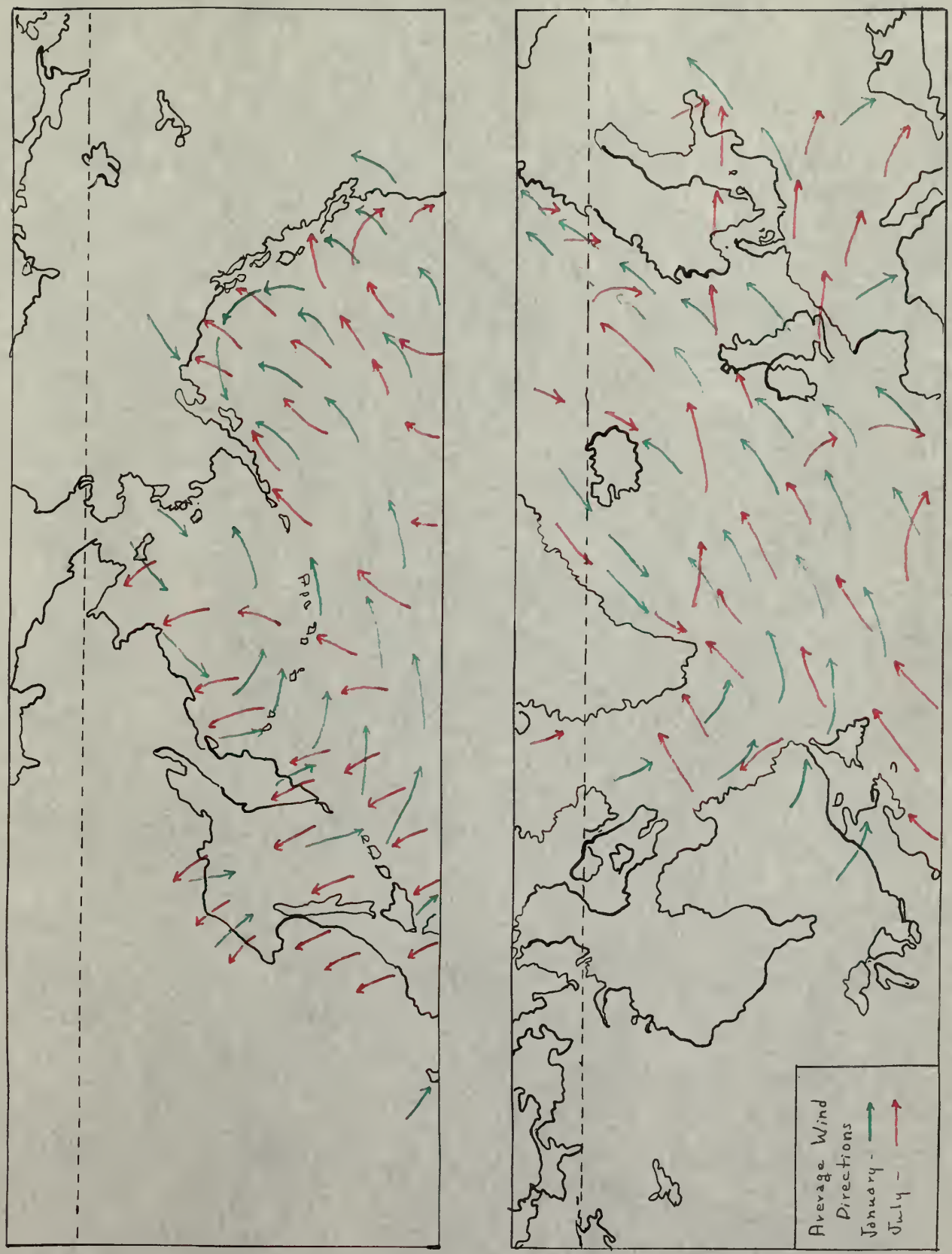
low pressure tongue, which extends over the Baltic sea, is a pathway for marine influences inland.

The map of wind directions on page 65 shows the variability of winds over all regions. Although they generally blow from a westerly direction, the migrations of the low-pressure systems account for these variations. In January, when the low pressure systems have moved farthest southward, all the west-coast areas are favored with a warm southwest wind. The east-coasts do not conform here. Winds blow from a more westerly or north-westerly direction at this time, and thereby make the interior coldness strongly felt.

In summer, the low-pressure centers move far north over the Arctic, with a corresponding shift in the direction of the winds. They now blow from the northwest and cool the land. For the other areas, however, the winds blow from the southwest and carry warm influences over the land. The winds over Hokkaido, Karafuto, and Kamchatka, in contrast, blow in the opposite direction due to the monsoon condition which prevails on this east-coast because of the extreme contrast in temperature between the land and ocean at this season. The direction of these southeast monsoon winds is what gives Hokkaido its summer rainfall maximum.

All areas lie in the path of cyclonic storms. As a result, weather conditions vary from week to week, and may change very rapidly. They give frequent periods of gales and stormy weather during the winter due to the well developed

MAP XV



Average Wind
Direction
Wind

pressure systems. In the summer, calm weather is more frequent because these cyclonic storms are less intense in their activity.

Just as the Scandinavian highlands act as a barrier to the continuation of marine influences inland, these areas also have barriers, which give similar results. A glance at the relief map, page 67 , will show that many of the areas have highlands. The Canadian Rockies and Alaska Coast Range are similar to the Scandinavian highlands, for they prevent marine influences from penetrating inland, while they act as a barrier to the great masses of cold air from the northeast. The Scottish Highlands are the chief agent in shaping regional climate in this area. The highlands of the Maritime Provinces and Newfoundland are no considerable barrier. Winds may blow with full force over the whole region toward the low-pressure center south of Iceland. The mountains of Hokkaido are not so high but that the cold winds from off the continent are able to blow over them. They become colder as they cross the snow-capped mountains, and descend in icy blasts on the north and east sides of the island. A more northerly latitude and mountains near the coasts of Karafuto and Kamchatka prevent the oceanic conditions from extending farther inland. The continuous highland of Iceland allows only the south and southwest coasts to be modified. All of Denmark, Finland, and the Baltic States are low-lying, but they are too far from the open ocean. The winds lose their warmth and moisture when they reach these areas. The Baltic, however, does modify conditions a small amount.

MAP XVI

(From J.P. Goode "School Atlas")

Relief Features
Elevation in feet

CHAPTER V

ANALYSIS OF REGIONAL ENVIRONMENTS AND THEIR INFLUENCES

One conspicuous similarity of these areas is their locations in respect to water bodies. They are almost entirely surrounded by water, but not all of them are in such favorable locations as the Scandinavian peninsula. The peninsula is fortunate in its position, which is so close to the great markets of western Europe. Denmark lies in an even more favorable situation. Iceland and the Maritime Provinces are likewise near enough to these markets, and those of northeastern United States and Canada, and Newfoundland controls the mouth of the St. Lawrence. The Baltic States and Finland are on a "blind-alley" as far as trade and commerce are concerned, yet they are not too far from important markets.

Less fortunate are the areas in the western part of the Pacific ocean. Hokkaido, however, has the main island of Japan as its market. The peripheral location of the southern coast of Alaska and British Columbia has retarded development there.

Another comparison may be drawn between the surface features of these areas and those of the peninsula. In the last great Ice Age, an extensive ice-sheet covered the northern parts of North America and Europe, and was responsible for molding and reshaping the underlying areas. Three general results from this glaciation, varying in form in different

localities, are apparent on the peninsula.

One of the results is represented by the present relief and topography of the Norwegian west coast. Similar conditions are found on the south coast of Alaska and Iceland, and the west coasts of British Columbia and the Scottish Highlands. In these regions, the highlands are bold, rocky surfaces, denuded of soil and vegetation. The intervening depressions are either steep-sided valleys or contain bogs and deep lakes. The coastlines are irregular and deeply fiorded, which provide excellent harbors; and numerous rocky islands fringe the coast. The east coasts of Nova Scotia and Newfoundland have similar coast structures in a somewhat modified form, but the surrounding land is level and low instead of being high and precipitous.

The areas of level land bordering the coasts are found where streams are silting up the heads of fiords and bays. On the north coast of Scotland, where cliff edges are not over 200 feet, "cliff-top" villages occur. Inland in the Highlands, the bottoms of some of the valleys have gentle slopes and good soils. The only usable level land in Iceland is on the south and southwest coasts, and it occupies about one-fourteenth of the whole island.[1]

These limitations of level land place restrictions on the size and distribution of the population, as well as on the

1: Mill, H., "The International Geography," page 212.

activities of the people. Table IX and Map XVII on the following pages, illustrate these conditions. Both the distribution and density are necessarily irregular because of the uneven distribution of suitable land for settlement. "Human settlements in the Highlands are conspicuous for their compactness, small size, peripheral distribution and sparsity. Their situations are littoral or in glens, on level patches at a low altitude widely scattered in a land of bulky uplands of moderate elevation."[1] This description is characteristic of the other regions as well.

The populations of these areas, with the exception of Iceland, are essentially rural. The 1935 census of Iceland placed the number of people living in towns or villages higher than that in rural districts. The city of Reykjavik alone, with its 22,000 inhabitants, contained about one-fourth of the entire population of the country.[2]

The types of activities engaged in by the people are entirely dependent on what these regions have to offer. Norway has only limited resources, so the people have gone to the sea for a livelihood. These regions in the same way lie in close proximity to the main fishing grounds of the oceans. (Map XVIII, page 74 , shows the locations of the more im-

1: Ogilvie, A., "Great Britain, Essays in Regional Geography," page 372

2: Hanson, E., "The Renaissance of Iceland," Geographical Review, 1928, page 60

TABLE IX

POPULATION [1]

(Omitting Scandinavian Peninsula)

Region	Area per Sq. Mi.	Population	Density per Sq. Mi.	
Hokkaido	88,775	2,812,335	32.0	
Karafuto	36,089	295,196	8.0	
Alaska (entire region)	586,400	59,278	0.1	
British Columbia	No available data			
Nova Scotia	20,743	512,846	-	
New Brunswick	27,473	408,219	-	
Prince Edward Is.	2,184	88,038	-	
Newfoundland (with Labrador)	42,734	289,516	1.9	(greater for this area)
Iceland (southwest region)	4,125	46,765	11.3	
Scotland (entire region)	29,796	4,842,554	163.0	(less for this area)
Denmark	16,575	3,706,349	224.0	
Estonia	18,353	1,126,413	161.4	
Latvia	5,099	1,950,502	76.3	
Lithuania	21,489	2,499,529	115.1	
Finland	134,557	3,667,567	27.3	

1. Data from Statesman's Year Book, 1937

TABLE IX

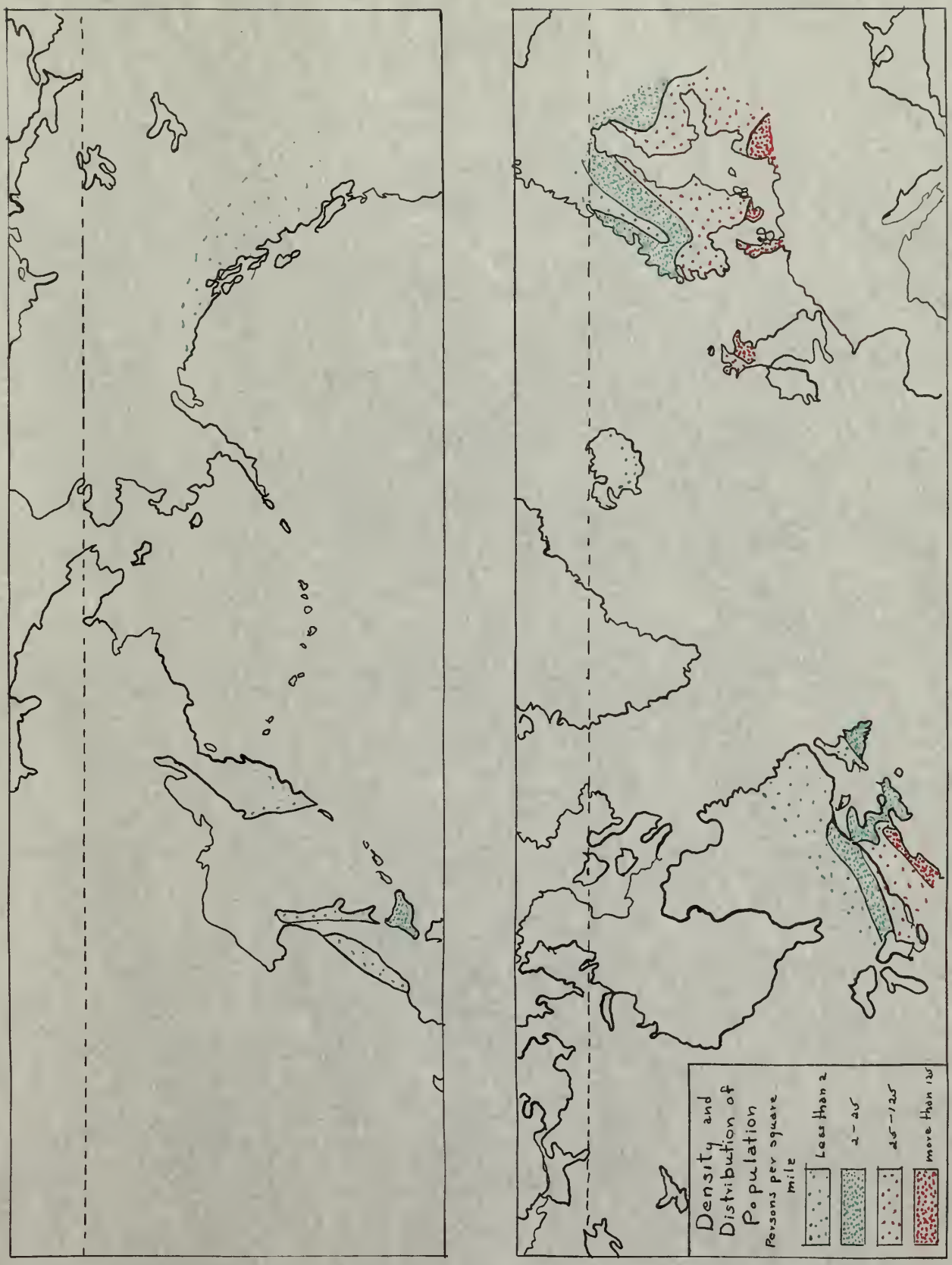
POPULATION 1

(Selected Appalachian Counties)

Section	Area sq. mi.	Population	Decrease/Increase per sq. mi.
Braxton	514.00	14,732	28.7
Clearfield	1,154.00	81,691	70.8
Elk	827.00	37,977	45.9
Forest	432.00	5,571	12.9
Gilmer	341.00	8,693	25.5
Greenbrier	1,020.00	34,453	33.8
Harrison	419.00	69,739	166.4
Lewis	393.00	19,134	48.7
Marion	309.00	56,749	183.7
Monongalia	365.00	75,509	206.9
Nicholas	654.00	26,233	40.1
Pocahontas	940.00	11,267	12.0
Preston	650.00	29,037	44.7
Randolph	1,040.00	27,178	26.1
Ritchie	453.00	10,849	23.9
Taylor	175.00	16,963	96.9
Tucker	420.00	7,884	18.8
Upshur	355.00	21,551	60.7
Webster	556.00	15,809	28.4

1. Table from Schiessman's Geography, 1954

MAP XVII


Density and Distribution of Population
Persons per square mile
Less than 2
2 - 25
25 - 125
more than 125

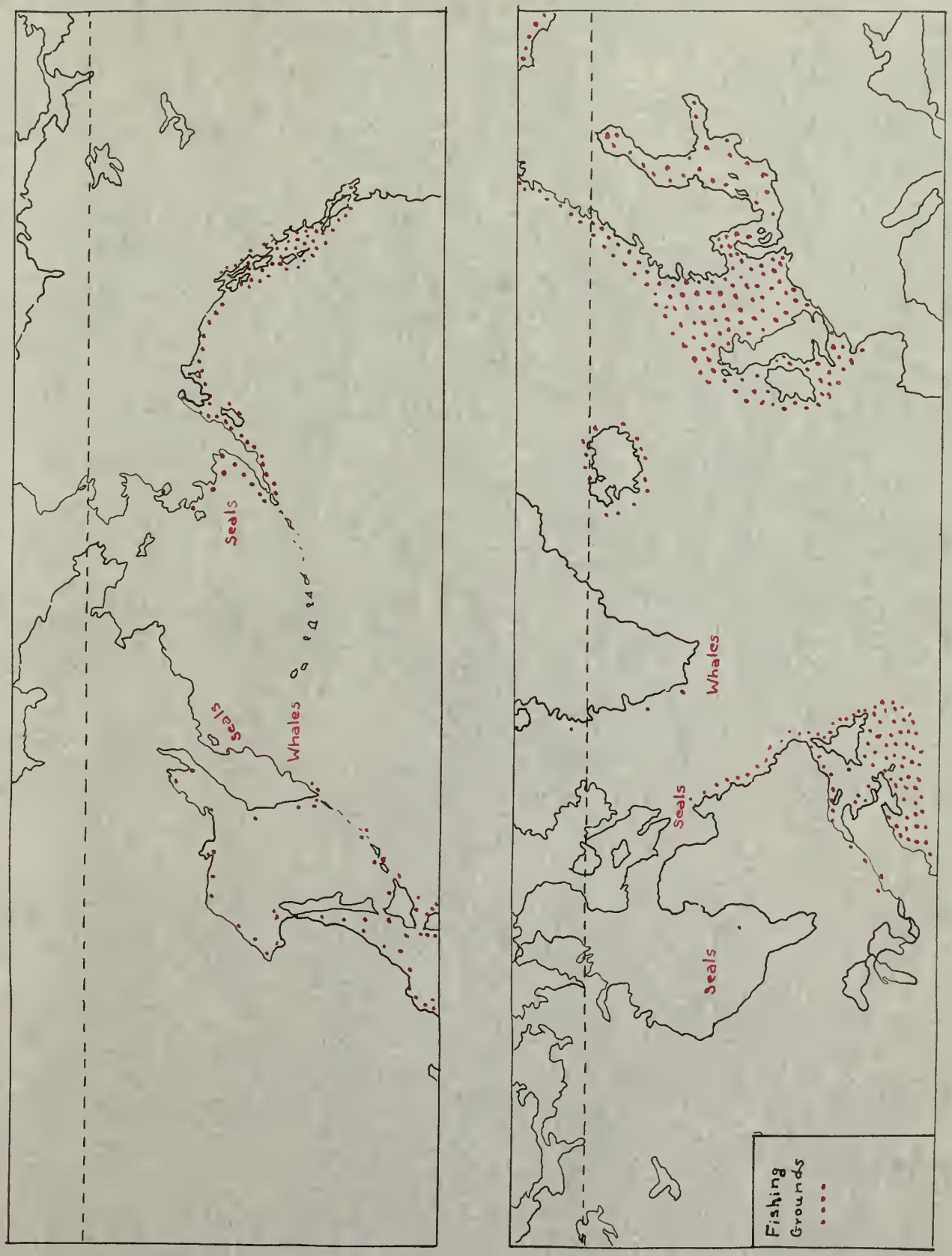
portant fishing grounds the world over.) The numerous bays and islands and the inhospitality of the land to other activities turn the people toward the sea.

Agriculture, however, meager as it is in most cases, is the dominant occupation of the people. In 1920 the number of Icelandic people employed in the fisheries was 19.8% of the total population, while that number in agriculture was 46.2%.[1] Latitude and the danger of frost control what crops can be grown here. Cereals cannot be grown. Large fields with suitable soil are lacking, so the land is used for hay and pasture instead. It is claimed that the lowlands of the south, if developed properly for dairying, could support the entire present population with this one activity. One interesting modern phase of agricultural development is the increasing use of the warm-spring waters for irrigation. It is estimated that "the average potatoe crop al ne can be doubled in this way, both by the artificial lengthening of the season and also because of the protection given against summer frosts."[2] The only crops raised here are turnips, potatoes, and cabbages. Dairying is becoming an important source of income, and the cooperative societies procure markets for these products.

1: Hanson, E., "The Renaissance of Iceland," Geographical Review, 1928, page 60

2: Hanson, E., "The Renaissance of Iceland," Geographical Review, 1928, page 55

MAP XVIII



In the Scottish Highlands, much of the ground is marsh or bog, and consequently has acid soil. These areas are so small and so isolated that it does not pay to try to improve the land by draining it or curing its acid condition. Summers, which are cool, cloudy, and damp are well adapted to cultivation of turnips and oats. Barley may also be grown. The agrarian system to which these settlements belong is known as the crofting system. It is an independent, self-sufficing system, in which the holding provides food and necessities needed. This system affords but a low standard of living. Most of the crofters have, for this reason, been compelled to migrate to more fertile lands in other areas, where they can make a better living from their land.

The variety and number of other occupations depend on the resources of the regions. The south coast of Alaska and British Columbia have abundance of timber, fish, gold, copper, and water power, while the leading economic activities are lumbering, wood-pulp manufacturing, salmon canning, and mining. If this region were as near the European centers as the Scandinavian peninsula is, it might surpass Scandinavia in development because minerals and water-power are here to provide the basis for chemical and steel industries which have developed under similar site conditions in Norway and Sweden.

There is little industry in the Scottish highlands aside from the small workings of zinc, lead, and copper deposits, which are of minor importance on account of their

small scale occurrences. Some building stone is quarried from masses of granite which penetrate the old crystalline rocks. In contrast to the Norwegian coast, there are no forests on the Highlands. The one valuable but potential resource is the possibility of developing a modern hydro-electric system. Local conditions, as in Norway, facilitate the construction of such projects. Once again, the only retarding influence is the lack of raw materials which require power for manufacture.

Although Iceland lacks a variety of resources, 11.8% of the population was employed in industries in 1920.[1] The chief industries are the preparing of fish and dairy products for market. This country is the main source of Iceland spar, which is used for optical instruments. Transportation here, as in other areas, is under the serious handicap of rugged topography. No rivers are navigable because of steep gradients and numerous impediments. Nevertheless, the Icelanders "in spite of their poverty and isolation, have kept pace with their Scandinavian relatives in Europe. Among the leaders mentioned in the Encyclopaedia Britannica, Icelanders, in proportion to the population of their country, outnumber every other non-English-speaking people."[2]

1: Hanson, E., "The Renaissance of Iceland," Geographical Review, 1928, Page 60

2: Van Valkenburg, S., and Huntington, E., "Europe," Page 235

The next group of areas correspond to the northeastern portion of the Scandinavian peninsula; it includes Finland and Newfoundland. During the time of the last great Ice Age, this part of the Scandinavian shield was a low plateau. Glaciation scraped bare much of the old rocks and formed numerous lakes and rivers. Some thin, rocky soil is found today along the river banks and Baltic coast. Lack of good soil combined with high latitude make this area better suited for forests. Lumbering is the principal source of income, which results in a sparse, unevenly distributed population.

Finland is a continuation of the Scandinavian shield, and the results of glaciation show essentially the same features. Some 50,000 lakes, the majority of which are in the southern half, were formed, and now serve as means of transportation and reservoirs for water power projects, the potential power of which is estimated at 1,800,000 h.p.; and that already developed, at 343,000 h.p. The southern part was covered with boulders, gravel, and sand, and now furnish the only fertile areas (6.2%) close to the coast, where the majority of people live.

The interior of Newfoundland has outcrops of old Archean and Paleozoic rocks, which form the rocks of the Canadian and Scandinavian shields, too. The early connection between these shields was developed fully in Part One. Its main interest lies in the fact that the minerals and their associations of both areas are the same. Most of the rocks of

Newfoundland, however, are of a later age, and consequently contain large and important deposits of iron, copper and some coal.

The populations of both areas are sparse and unevenly distributed. Indeed, Finland is the most sparsely inhabited country of Europe. It is about twice the size of Illinois, but its population is less than for the city of Chicago.[1] The density is 25 persons to the square mile for the whole area, but the southern part has a greater density because of the predominance of level land in this area. The population of Newfoundland is scant, with the greatest density along the coast.

Agriculture as an activity in both areas supplements other occupations. The cool climate of Finland decidedly limits the crops which can be grown, although barley, oats, potatoes, rye, sugar beets, and hay are cultivated. Dairying is of growing importance, and cooperative societies, as in Iceland and Denmark, are promoting this activity. The summers of Newfoundland, likewise, are cool, but the period available for plant growth is long enough for hay, oats, potatoes, and some vegetables to be raised. Although there are large areas of good agricultural land in the interior and at the heads of the bays, agriculture has been almost entirely neglected. The surrounding waters contain such an abundance of fish, that

1: Blanchard, W., and Visher, S., "Economic Geography of Europe," Page 341

catching and curing them occupies almost the entire population. Of the total population of 270,000 people, nearly 70,000 are fishermen; 3,300 farmers; and only 1,200, miners.[1]

Fishing is of minor importance to Finland, because the Baltic lacks an abundance of fish. Li ited resources, therefore, have forced the people to turn to lumbering, as in Sweden, as their principal activity. Finland is thus the largest European producer and exporter of timber, because forests cover about one-half of the entire area. The type of export reveals that these people are making the most of their environment by carefully preparing their one resource for market. Wood products such as sawn lumber, wood pulp, paper, and wood manufactures are exported rather than the raw lumber.

Timber is found primarily in the river valleys and heads of deep bays in Newfoundland. The tops of the rocky hills are for the most part bare or scantily wooded. The people have never engaged in lumbering or mining activities to any extent, perhaps for the reason that the surrounding water provides such an abundant supply of fish. If, in the future, the mineral and timber stores should be exploited, this region would be able to support a far greater population and with a higher standard of living.

Transportation in both localities is restricted by topography and climate. The inland waterways of Finland are

1: Jones, C., "Economic Geography," Page 32

used chiefly for floating lumber in summer, and hauling in winter. Highway and railroad construction has been slow. The roads of Newfoundland are located, at present, in the immediate vicinity of St. John. The main railway line which crosses the island is handicapped by high relief and severe winter conditions. Foreign shipping may continue all year because the surrounding waters never freeze. The island is fortunate in its location in respect to these water bodies and for its position at the gateway to the St. Lawrence river. In contrast to this, both Sweden and Finland are on an inland sea which is subject to freezing. Shipping is held up in an average year from November to May in the Gulf of Bothnia. At this time northern Sweden can transport by way of the Luleå-to-Narvik railway. Even the shores of the Gulf of Finland are blocked for 140 to 150 days, which is a serious handicap to commerce and trade.[1]

The general effect of the great ice-sheet on the Norwegian west coast and on northern Sweden was to erode great thicknesses of the surface layers of rocks and leave the underlying bedrock exposed and denude of all soil. Another form of the glacier's work was to deposit all of this eroded material toward the south, and to cover these surfaces, in many cases, with a thick mantle of sand, gravel, or boulders. All of central and southern Sweden was thus covered by debris from the highlands to the north and west. A late-glacial sea spread this

1: Kendrew, W., "The Climate of the Continents,"

debris evenly, and thereby provided extensive plains of level, fertile land.

The regions which have similar conditions, but with some variations and modifications, include Denmark, the Baltic States, Northeast Scotland, and the Maritime Provinces of Canada. Glaciation favored these regions with more rolling land, although none of them have plains so extensive as those of the peninsula. In all areas, the level landscape is broken by low morainic hills, which are only a few hundred feet in height, as in Denmark, or by resistant rock outcrops, such as are found in Nova Scotia and New Brunswick.

Soils everywhere vary in their productivity and local distributions. Northeast Scotland was endowed with poor, acid soil, but "an energetic people has done much for the improvement of its environment. The glaciated soils have been cleared of their boulders, the land has been drained, the peat mosses by which much of the surface was at one time covered have been reduced in area, the soil has been cultivated, and one of the most important cattle-rearing industries in Britain has been developed."[1] Similarly, the people of western Denmark have been forced to fertilize the poor, sandy soils, while the eastern area is naturally fertile due to a mixture of sand, chalk, and glacial clay. Climate, of the damp and cloudy west-coast type, combined with the lack of extensive good soil regions, has

1: Ogilvie, A., "Great Britain, Essays in Regional Geography," Page 385

tended to turn the attention of the people to the raising of livestock. With the aid of their cooperative societies, dairy products are the chief export of Denmark.

There is a gradual change of soils from north to south in the Baltic States. The northern section has either barren outcrops of rock or thin, rocky soils. The south, on the other hand, has deep loamy soils, and has, naturally, the greatest agricultural development. While there is much good agricultural land in the Maritime Provinces, greater attention has been paid to other activities so that these arable regions have long been neglected.

Populations everywhere tend to be more evenly distributed than is true of the regions previously discussed, and all areas of good soils have the densest populations due to the fact that a larger number of people can obtain a living from the soil. The population distribution map on page 72 illustrates this condition. One exception to this is seen in the Maritime Provinces, where population is relatively sparse. Agriculture in New Brunswick is overshadowed by mining and lumbering, which activities do not require large populations, and also because the people of Nova Scotia are occupied in marine activities, as well as mining and manufacturing.

The population is essentially rural, although there are many more small towns and cities here as compared with the areas previously analyzed. Only 44% of Denmark's people are city dwellers and Copenhagen alone contains almost one-fourth

of the total population.[1] The whole east coast is studded with small agricultural villages and fishing towns. The urban population of the Baltic States is even smaller, i.e., 24% of the people in Estonia, 23% of those in Latvia, and 13% of those in Lithuania live in towns.[2] These figures are interesting when they are compared with the direction of the poor-to-fertile soils, which increase southward.

The largest percentage of the population of these areas is engaged in agriculture, excepting Nova Scotia and New Brunswick. Since all of these areas are relatively small in extent, agriculture is intensive and the holdings are small in size. One-half of the farms in Denmark are less than thirteen acres, and only a few farms exceed one hundred acres. Those in the Maritime Provinces are larger because there is less demand for land. Rich and prosperous farms, averaging from 100 to 240 acres in size are located in the neighborhood of the Bay of Fundy.

Practically the same crops are grown in every region, although there is a tendency to raise livestock, where the climate is too damp and cool for most crops.

The variety and abundance of resources are important in shaping the economic activities of these people. The under-

1: Van Valkenburg, S., and Huntington, E., "Europe," Page 233

2: Van Valkenburg, S., and Huntington, E., "Europe," Page 269

lying rocks of Denmark and the Baltic States are so deeply covered by glacial material, that the areas cannot be prospected for minerals. In the Maritime Provinces, however, glaciation caused many of the mineral deposits to be within easy access of exploitation. Thus the mineral wealth of the Provinces is considerable and consists of small deposits of gold, iron, copper and zinc in New Brunswick, while extensive coal fields and iron deposits are mined in Nova Scotia. The only fuels in Denmark are peat from bogs in the northwest and some lignite in the southwest. Oil-shales in Estonia are being worked for their oil content.

Forests, as in Sweden, offer an additional source of income to most of these areas. Extensive forests make New Brunswick a center of lumbering activity. Nova Scotia has seriously depleted her forests, although the activity is still carried on. The numerous lakes and rivers here enables the logs to be brought to the mills with ease. Most of the manufacturing of this region is carried on in connection with agriculture and lumbering. In the Baltic States, forests cover about one-fifth of the area, and wood products are the chief export. Extensive forests at one time covered Denmark, but most of the trees were removed to obtain timber for shipbuilding.

The position of the Maritime Provinces in relation to the Grand Banks, with their abundant supplies of fish, has made these people essentially fishermen, even though the region has a good many other resources and activities to offer them. Good

harbors and the close proximity of all these areas to the sea, is perhaps another reason why the majority of the population has turned to the sea. Limited resources and good harbors have made the population of northeastern Scotland seek a livelihood from the sea. They have developed one of the greatest fishing areas in the whole of Britain. It is surprising that the Danes have not developed their fisheries to a greater extent than they have.

The population of the Maritime Provinces have great potentialities of minerals, water-power, and manufacturing before them in contrast to the limited possibilities of the Baltic States and Denmark. Nevertheless, the Danish people are an excellent example of a population who have successfully adjusted themselves to their environment. The prosperity which they now enjoy, however, depends primarily on the maintenance of the present extensive markets in Great Britain. This dependence places them in a somewhat precarious situation. If they should lose these markets, the results would be disastrous for the country, for the land could not support the same large number which it does at the present time.

Unlike the preceding regions, Hokkaido, Kamchatka, and Karafuto owe their surface configuration and relief to other geographic factors than the glacier's molding and reshaping influence. In an earlier discussion, these areas were found to agree with the Scandinavian peninsula in respect to climate, with

the exception of Hokkaido's monsoon condition, which is responsible for the summer rainfall maximum here. These areas lie in the path of cyclonic activity, and therefore have continuous changes in weather conditions.

The central mountains of Hokkaido, as was pointed out before, are not high or continuous enough to form a complete barrier to the prevailing winds. In Kamchatka and Karafuto, the mountains are a barrier, and in addition to high latitude, allow the more favorable areas for settlement to be on the southern shores only. Kamchatka need not be considered further because, on account of its isolated location and sparsity of population, the area has not been searched for its possible resources.

The population of Hokkaido and Karafuto is essentially agricultural, here as elsewhere, although mining, lumbering, and fisheries are of importance. The area can support a larger population than it now does, and immigration rather than emigration is characteristic. The density of population is low, i.e., 32 persons to the square mile in Hokkaido and 8 in Karafuto. This is a small density when compared with other regions which have fewer resources.

These two areas are a part of the Japanese Empire and form an outlet for the over-populated islands. Until recent years there has been little settlement here chiefly because the climate is too rigorous for the people. The government has been making strenuous efforts to increase

emigration from the main island, but the immigrants here do not take kindly to any changes they must make in their diet and way of living. Karafuto is even less attractive because of its northerly latitude.

Agriculture is the chief occupation especially on the plains of Ishikari and in the neighborhood of Sapporo, an area which supports about a half million people. The density is exceptionally high here because this is the only portion where rice, the staple food, may be grown. Other crops are oats, barley, maize, and millet and such vegetables as peas, beans, and potatoes. Peas and beans take the place of rice, and the potatoes are manufactured into starch. The majority of the localities are too cool and damp for good crop results; thus livestock has been increasing in importance. Most of the farms are extremely small, averaging only 7-1/2 acres per family.[1]

Both areas have important coal formations, and like the Scandinavian peninsula, they lack the other requirements for large scale industrialization. In this case it is iron, although some limonite near Muroran is mined. Hokkaido has 34% of the total coal reserves of Japan, but it produces only 17%.[2] The reason for this may be explained by its poor

1: Stamp, L. D., "Asia, An Economic and Regional Geography," Page 551

2: Orchard, J., "Japan's Economic Position," Page 283

transportation situation, and its scant population. The mines in Karafuto are likewise estimated to be large in extent.

Considerable industries, which depend on local raw materials, are carried on. Coal and hydro-electric plants furnish the power. The islands have important forests of coniferous trees, and the timber from these, with an additional supply from Kamchatka, support large paper and pulp industries. The primary refining of metals, and canning industries also have importance. The fisheries here have developed so rapidly that they place Japan as the foremost fishing country at the present time.

This area is similar to the Scandinavian peninsula in climate, with the exception of the summer monsoon condition, and in its surface features although glaciation never had a part in reshaping its surface conditions. Other characteristics compare favorably, for unlike the rest of Japan, they lack winter crops, show an importance of temperate crops, a greater importance of livestock industry, and have substantial dwellings.[1]

1: Bergsmark, D., "Economic Geography of Asia," Page 403

SUMMARY

A study of the continents show that there are subdivisions of each in which one or more of the physical geographic factors commonly occur. This observation is interesting because similarities in climate or topography, for instance, have resulted in similarities in the distribution of populations, as well as in the activities of the people. In some cases, however the results are diverse. Further examination of these subdivisions show that all are located approximately in the same climatic belt, which is extensive enough to allow a considerable range of latitude between them. Thus, the areas which show similarities in their physical conditions and development to the Scandinavian peninsula, are located in the temperate zone, although not in the same degree of latitude.

The location of these areas in comparison to the peninsula can be classified a proximately in respect to latitude as follows:

Scandinavian peninsula:	56°N. lat.--Arctic Circle
West coasts of Continents:	
Areas in Europe	56° -- 65° N. lat.
Areas in North America	52° -- 58° N. lat.
East Coasts of Continents:	
Areas in North America	44° -- 50° N. lat.

Areas in Asia 42° -- 50° N. lat.

Climate is responsible for the Northerly extension of human habitability in the Scandinavian peninsula. Since it is the most important feature of the environment, it has been used here as the basis of consideration and comparison. Similarity of climate is the one factor which commonly occurs in all areas. Those areas on the west coasts of the continents conform favorably in respect to latitude as well as climate, while the east coast areas are found to be located at lower latitudes, where the modifying influences of winds and ocean currents are less prevalent and continental influences are greater.

Relief, land surfaces, resources, along with climate are responsible for the size and distribution of the population of the Scandinavian peninsula. On these factors, too, depend the activities of the people. They have used their limited resources remarkably well, and have thus solved the problem of living comfortably in such a northerly latitude.

It is in respect to these geographic factors that most of the diversities between regions occur. While climate is essentially the same, the areas differ in relief, which is illustrated in map XVI, page 67, although they conform to smaller regional divisions of the peninsula. The number and variety of resources are unevenly distributed throughout the world; some areas have more than others, but the use made of them depends on the population. Thus, Newfoundland has im-

portant mineral resources which have just barely been touched. The interest of the people lies in the fisheries, a resource which does not give great material wealth, while the minerals and forests have been neglected. Denmark, in contrast, has limited resources, but an energetic people have developed these to the fullest extent. The country is prosperous and enjoys a high standard of living.

The southern portion of the Scandinavian peninsula is considered to be in Europe A, where culture, health, national income, and standards of living are highest. The remainder lies in Europe B, due to the fact that the environment is too severe for the highest standards to persist effectively. The degree of civilization depends on climatic energy and the ability of the people to make the best use of their endowments. This explains why the standard of civilization in Denmark and the Lowlands is very high, and comparable with southern Norway and Sweden.

The next lower, in the scale of degree of civilization, which is still high, are Finland, the Baltic States, Iceland, and the Maritime Provinces, similar to the central part of the Scandinavian peninsula. Medium and low degrees are found in the areas of the Arctic region.[1] The reason for this may be explained by the sparsity of population, and location,

1. From the Law of Civilization. Huntington, E., and Cushing, S., "Principles of Human Geography," Page 256.

which is off the important channels of communication. An area which cannot use its resources for exchange, because of competition with other regions more favorably situated, will necessarily have a lower standard of living. The result is only a minimum exchange of cultural and material benefits.

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